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RESOURCE MANAGEMENT STRATEGY IN THE FRENCH NAVY

by

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June 1991

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**Resource Management Strategy in the French Navy**

by

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Lieutenant Commander, United States Navy  
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Submitted in partial fulfillment of the requirements for the degree of

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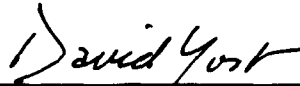
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## ABSTRACT

This thesis focuses on the French Navy's resource management effects in the areas of ship construction, maintenance, and personnel. The central question is whether the French Navy will be able to both upgrade an ageing fleet, and man that projected new fleet with qualified personnel, given defense budget constraints and the fact that naval pay scales are falling below those in the private sector. The thesis concludes that novel approaches to maintenance and upkeep, and a reform of length of service contracts may help the French Navy meet its global missions. The thesis recommends that the French Navy consider greater cooperation with the U.S. Navy so that both navies may avoid wasting time and money investigating maintenance and procurement methods already employed or abandoned by the other. It also recommends greater standardization of responsibilities, methods, and programs in the French ship repair organization.



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## **DISCLAIMER**

The information in this thesis has been obtained from unclassified public documents and unclassified interviews with French sources who have been promised anonymity. The author's intention to write an unclassified thesis on the topic was made clear to all interviewees. Interview dates are indicated in the references. The views expressed and the conclusions drawn from those interviews are those of the author alone, and should not be construed to represent those of the Department of the Navy, or any U.S. government agency, or those of the sources. The findings are necessarily tentative, owing to the reliance on interview sources, the lack of comprehensive public data on some issues, and the French Navy's own non-standardized information management systems for some matters.

## **I. INTRODUCTION**

### **A. BACKGROUND**

The political, financial, and military spheres of the modern nation-state are inextricably intertwined. In a period of binding budget constraints, a dwindling manpower pool, profound international changes, and demanding technological modernization, the problems of resource management and strategic planning become increasingly important on every level. This thesis is intended to analyze the French Navy's recent efforts to manage its capital and personnel resources, and to map strategies for the future in the light of the current financial and political situation. The success of these resource

management strategies will determine the Navy's ability to meet the requirements of France's future global military missions.

Because France maintains a navy with global missions (including sea control, power projection, and nuclear deterrence) similar to those of the U.S. Navy, we may learn something useful for our own planning and strategy by examining the French Navy's current situation. Since the French fleet operates in the Atlantic and the Mediterranean and in some areas of the world beyond Europe (the Middle East, Persian Gulf, Horn of Africa, the South Pacific, etc.), French naval forces are important potential partners of the U.S. Navy, and as such we can benefit by knowing more about the strengths and limitations of the French Navy. But the large size of the French Naval establishment makes it necessary to be selective in choosing issues representative of the main resource management problems.

## **B. JUSTIFICATION AND METHODOLOGY.**

The thesis includes two main chapters: the first is concerned with surface ship upkeep problems, and the second with French Naval personnel. The justification for choosing these specific problems (as opposed to other strategic considerations, such as ship construction priorities) is due to the particular pressure that constrained budgets have placed on these two priorities.

These two chapters examine critical inputs to the French Navy's operational production function. The manner in which the French Navy manages these resource inputs will determine whether it will be more or less effective in pursuing its global security interests in years to come. The production function (Q) for the Navy can be written as follows:

$$Q = f(K, L_1, L_2)$$

Where  $Q$  = Naval Output, or readiness (the ability to meet military missions)

$K$  = Ships and Material (Capital)

$L_1$  = Human Capital<sup>1</sup>, professional service personnel

$L_2$  = Human Capital, conscripts

The inputs  $K$ ,  $L_1$ , and  $L_2$  are combined by the French Navy to produce output  $Q$ .<sup>2</sup>

For the last decade the defense budget has been averaging (in current francs) 3.65 percent of the Gross National Product. (The Navy's share has averaged 19.08 percent of the defense budget.) Interestingly, between 1986 and 1991 TITLE V<sup>3</sup> increased from 55.69 to 64.80 percent, while TITLE III<sup>4</sup> has

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<sup>1</sup>Human Capital—"The abilities, skills, and health of human beings that can contribute to the production of both current and future output. Investment in training and education can increase the supply of human resources." (Gwartney, *Macroeconomics*, p. 533).

<sup>2</sup>Naval output ( $Q$ ) can be evaluated using various measures of readiness. Substitutions can exist between the inputs ( $K$ ,  $L_1$ ,  $L_2$ ) that will maintain the same level of readiness and possibly produce cost savings. If inputs are complements in production then the loss of some of one input may have magnified consequences in terms of output (readiness). A discussion of how the U.S. and French Navies measure readiness is found in Chapter II and Appendix C.

<sup>3</sup>The Navy's budget is divided into two major appropriations, TITLE V and TITLE III. TITLE V represents capital investments. It is divided into research and development (R&D), new construction, and naval facilities. The input ( $K$ ) mostly reflects TITLE V expenditures. The second major appropriation, TITLE III is divided into salaries, social benefits (e.g., health) operations and maintenance (O&M), and special subsidies (e.g., Navy Museum). the human capital inputs ( $L_1$  and  $L_2$ ) are subsumed under TITLE III. (loi de finances)

<sup>4</sup>TITLE III, in simplified terms, is divided into fixed and variable costs. Salaries and social benefits are fixed costs to the Navy because they cannot

decreased from 44.31 to 35.20 percent.<sup>5</sup> Presumably the French Navy's goal is to maximize output (Q) given the employment of resources from TITLE III ( $L_1$  and  $L_2$ ) and TITLE V (K) and existing budgetary constraints. Each chapter in the thesis surveys current problems faced by the French Navy in managing its resource inputs (K,  $L_1$ , and  $L_2$ ) efficiently, and evaluates alternative solutions under consideration.

### C. OUTLINE.

Chapter II deals primarily with K, i.e. ships and material inputs. Specifically, the upkeep periods of naval surface ships are reviewed. The review reveals problems posed to ships' life cycles in extending the intervals between upkeep. The motivation for extending upkeep intervals and the methods used to determine the maximum period between upkeep are addressed. The technical assistance that the U.S. Navy could provide in this matter is also investigated.

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control these costs (i.e., inputs  $L_1$  and  $L_2$  tend to be fixed in the short run). The variable costs are those that the Navy can "control" and are generally referred to as O&M costs. Since 1986, O&M as a percentage of the Navy budget has decreased from 19.27 to 12.75 percent (or 14.16 percent without the transfer of funds—see Footnote 5). These funds pay for almost everything that affects crew morale such as habitability improvements, training, and ship upkeep. Chapter I discusses this in more detail.

<sup>5</sup>More precise accounts indicate that TITLE V has risen from 55.69 to 63.39 percent while TITLE III has decreased from 44.31 to 36.61 percent. The discrepancy comes from a shifting of maintenance funds in 1989 of 500 million francs (\$90.9 million) and in 1991 of 540 million francs (\$98.2 million) from TITLE III to TITLE V. This money was TITLE III upkeep money directly transferred and used for the same purpose under TITLE V. The reason for the shift was that major maintenance was accomplished in those years which are considered capital investments because they seriously improve the ship's life. (See Appendix C.)

One objective of the second chapter is to help clarify the motivation behind the 1988 decision to extend the time between ship upkeep periods. It is intended not only to address the origins of upkeep extensions, but also to consider any possible ramifications on the future of the French fleet.

Descriptions and opinions concerning the extended periods between ship upkeep have been obtained primarily through interviews.

Chapter III deals with the declining Title III budget (salaries, training, etc.) and its effect on personnel (both  $L_1$  and  $L_2$ ). The impact on recruitment and reenlistment is examined in the case where this declining trend continues. Finally, the potential impact of a change in national military service (affecting  $L_2$ ) on overall naval readiness is also examined.

#### **D. SCOPE, LIMITATIONS AND ASSUMPTIONS.**

A review of French defense budget documents provides information for comparisons between investment (procurement, R&D) and operating expenses (military personnel, O&M). All monetary figures are given in French francs and the dollar equivalent, using an exchange rate of 5.5 francs per dollar.

In the most general terms, this thesis is intended to advance the understanding of problems of resource management and strategic planning through an analysis of the French Navy's efforts to manage its personnel ( $L_1$  and  $L_2$ ) and capital (K) resources to accomplish its missions (Q).

Because the Navy's success in managing its resources to obtain efficient production (i.e., minimizing costs of accomplishing its missions or maximizing missions, given budgetary constraints) will determine its ability to meet France's global military objectives, another goal of this thesis is to

attempt a reasonable forecast as to how successful that optimization might be.

The most important specific and relevant questions include the following:

1. Will the French continue to extend the time lag between the ship upkeep maintenance periods, and if so, what will be the long-term effects?
2. Will Title III continue to decrease, and how will this trend affect recruiting and reenlistments? What may be the indirect effect on naval construction goals?
3. Will the French Navy be able to man its ships or will shortfalls be evident in 1996 when the aircraft carrier *Charles de Gaulle* begins its sea trials?

## **II. CHANGES IN THE FRENCH NAVY'S MANAGEMENT OF SHIPS AND MATERIALS**

### **A. INTRODUCTION**

In the early 1980s the French Navy was forced by stringent budget cuts to reevaluate its policies regarding maintenance, personnel, and equipment. This chapter discusses strategies undertaken to develop a more cost-effective maintenance system, the status of the current upkeep system, and new proposals the French Navy hopes will increase a ship's longevity within the budgetary constraints. Effective management of its capital resources (K) will give the Navy more flexibility in consecrating resources to resolve problems that affect the morale of its personnel (L<sub>1</sub> and L<sub>2</sub>). (See Appendix C.)

### **B. THE BASIC STRATEGY: EXTENDING THE INTERVALS BETWEEN MAJOR UPKEEP MAINTENANCE**

#### **1. Rationale:**

From 1960 to 1978 the French conducted maintenance on their equipment in accordance with the manufacturer's guidelines, but found their work actually harmful to the equipment. As one interview source put it, "The more it is taken apart, the less it works!" The Navy was spending more time conducting scheduled maintenance and then repairing the repairs than doing actual maintenance. [Ref. 3]

As a result, the French Navy decided in late 1988 (a decision that was made official in 1990), to experiment with the possibility of extending the

intervals between maintenance periods. This meant extending the life cycle envelopes of the equipment without knowing its actual limits. [Ref. 4]

## 2. Determining the Interval For External Maintenance

There are three hull conditions currently being evaluated in prolonging the interval between IPER.<sup>6</sup> The intention is to be able to maintain an interval of 24 to 60 months depending on the type of ship. The questions under review are:

1. Is it technically possible to maintain the interval? Will the equipment be able to last without major work being accomplished between IPERs?
2. Can the paint hold up for the period in question?<sup>7</sup>
3. Can corrosion be held back sufficiently to meet the interval?<sup>8</sup>

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<sup>6</sup>IPER (Indisponibilité Périodique d'Entretien et de Réparation)—Major ship upkeep period (see Appendix A.)

<sup>7</sup>At present the paint on the hulls of French ships lasts approximately 36 months. An alternative for the French Navy is to employ the type of paint and application process currently used on U.S. Navy hulls. The paint employed for FFG-7 class ships lasts 61 months.

<sup>8</sup>To further increase hull life, sacrificial anodes made out of aluminum or zinc are attached to the ship's hull. The anode is more chemically active with seawater than the ship's steel hull. Therefore the reaction with the seawater will be concentrated at the anode saving the hull. This type of cathodic protection is used aboard most French ships. The F70 *George Leygues* and *Cassard* classes use an impress current cathodic protection system. This method supplies the hull with a current forcing it to become a cathode and therefore resisting corrosion. A study is underway by the French Navy on the use of impress current aboard the *Éridan* (tripartite) class minihunters and the *Durance* class replenishment tankers. [Ref. 5]



### **3. Pierside Maintenance**

As a partial response to minimum manning of ships, the Majorité Générale<sup>9</sup> in Brest and Toulon has a new upkeep assistance team for ships. This group, called the "Équipe, Entretien de Surface," consists mainly of unskilled personnel who are conscripts in the Navy doing their national military service. If a ship is to be in port for longer than 72 hours, the commanding officer can request the team from his squadron commander. The team (L2) chips and paints hulls (with materials provided by the Majorité Générale), permitting the ship's crew (L<sub>1</sub> and L<sub>2</sub>) to concentrate on deck and interior ship upkeep. This concept has been proven at Brest and is now under evaluation at the base in Toulon.[Ref. 6 and 7]

The French Navy is in the process of designing a technical assistance team to function in the same manner as the "Équipe, Entretien de Surface." It will be composed of mid-grade to senior petty officers possessing the various technical skills necessary to work on machinery, electronic, and electrical systems. The team will also work for the Majorité Générale and can be requested by commanding officers to assist ship's company during inport periods. It is the intention of the French Navy to have this team in place by 1992.[Ref. 8]

### **4. Determining the Interval for Machinery Maintenance**

Internal ship maintenance primarily addresses the needs of the machinery. The interval between upkeep periods for this area is normally

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<sup>9</sup>Majorité Générale—Unit in naval port responsible for ship's upkeep. (See Appendix A.)

bound by operating hours (e.g. a pump has maintenance conducted or is overhauled when it reaches a designated number of hours of operation). A ship's main propulsion diesel engine (MPDE) undergoes various inspections and maintenance that must be performed at different intervals of operation. Thus far, maintenance guidelines have been established by the manufacturer. The French Navy is investigating the possibility of delaying some, if not all, of the conditional maintenance until the IPER. Currently the responsible officials have not collected sufficient equipment operating data to be able to establish their own maintenance timetable. They do have data on small auxiliaries such as pumps, but the larger equipment (such as MPDEs) is still in the process of being evaluated. In order to delay the conditional maintenance, squadron and fleet commanders may have to make decisions as to which ship to send on a mission based on the operating hours of its machinery. There is no slack in the IPER program. The limits have been stretched to the point that equipment maintenance cannot be delayed past a scheduled IPER without risking equipment failure.

For the past two years, a reduction of maintenance experiment has been conducted in Toulon on the small boats assigned to the base (such as tugs). The working order of equipment is verified, but no maintenance is performed unless absolutely necessary. The Majorité Générale has saved about one half of its normal upkeep expenses without having any major equipment failures.[Ref. 9 and 10]

These ships are not complex engineering marvels (French Navy harbor tugs have only one diesel), and they can be easily monitored because they never leave port. This experiment needs to continue for a sufficient

amount of time (say for 10 years) in order to determine the effects on the lifespan of the ships. In addition, a comparison needs to be made with past machinery problems to help determine the validity of the experiment's results.

Since 1980 the Navy has cut back on the number of ships dedicated to particular missions, reducing mission strength to 80 or 90 percent of what it was prior to 1980. The Navy has made a conscious decision to decrease the amount of unnecessary underway periods. Priority is given to operational necessities. Prior to 1980 the Navy sent more ships than were required to participate in exercises. Today fewer ships are sent, sometimes only the minimum required to maintain a presence.

The goals are to maintain operational and training commitments, and not to interfere with the IPER cycle. The Navy may have to cancel an exercise or a ship's participation in the exercise in order to meet these goals. If the number of underway days has to be increased, every effort is made to ensure that the minimum number of days of upkeep (i.e. PEI<sup>10</sup>) is respected. Readiness is being driven by the new maintenance constraints.[Ref. 11 and 12]

At this time the condition of a ship's main engines determines the interval between its IPER (excepting aircraft carriers, where the determining factors are the condition of the catapults and the engines). To make it easier to determine required maintenance intervals, the French Navy has started to install vibration monitoring equipment aboard ships to measure the effects of

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<sup>10</sup>PEI (Périodes d'Entretien Intermédiaire)—Minor upkeep period. (See Appendix A.)

vibration on main propulsion and auxiliary equipment. The decision in 1990 to record and enter the data in a computer and to correlate the information from ships of the same class should enable the Navy to make reliable predictions as to equipment performance, once a sufficient data base is established.<sup>11</sup> An example of the planned IPER cycle for major combatant ships follows:

Type of Ship	Interval between IPER (months)	Duration of Successive IPER	Minimum Number of Workdays of P.E.I. between IPER
Aircraft Carrier ( <i>Clémenceau</i> )	24	3-5	140
Helicopter Carrier ( <i>Jeanne d'Arc</i> )	8	4	0
Missile Cruiser ( <i>Colbert</i> )	24	3-3-5	140
Missile Frigate ( <i>Suffren</i> )	24	3-3-5	140
Anti-air Frigate ( <i>Cassard</i> )	24	3-5	140
Destroyer F67 ( <i>Tourville</i> )	24	2.5-3.5-5	140
Aviso Type A69 ( <i>Détroyat</i> )	60	5.5	340
Dock Landing Ship ( <i>Duragan</i> )	22	3-5	120
Dock Landing Ship ( <i>Foudre</i> ) [Ref. 14]	24	3-3.5-3-5	140

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<sup>11</sup>French Navy ships currently have broad band vibration measuring equipment. They intend to replace this equipment with vibration measuring equipment that will give broad band and narrow band measurements. Large ships (Aviso A69 and larger) will be equipped with computers that will be able to analyze the information collected by the vibration monitors. Group or squadron commanders of smaller ships will maintain a pool of vibration analyzing equipment for the ships. This project will begin in 1991 with equipment being given to the SCMN. In 1992 installation will begin, the process is expected to take two to three years. [Ref. 13]

The new approach also involves changes in the upkeep of weapon systems; systematic scheduled maintenance trips to a workshop for dismantling to verify operational status have been replaced by "conditional" visits (only when necessary). The equipment receives maintenance based on the results of diagnostic testing which assures repair personnel that maintenance requirements are well-founded. Through close tracking of operating characteristics, the French Navy avoids useless equipment dismantling.[Ref. 15]

There is always a chance that diagnostic testing will not catch an incipient equipment failure that a close inspection through dismantling would have caught. This is the tradeoff currently being made, and the French Navy needs to track the results in order to determine the most effective methods. Unfortunately, a lack of computerized historical data currently prevents or hampers this type of analysis.

#### **5. Major Upkeep Maintenance**

Extending the maintenance envelope between IPER is a cost-saving measure that means that ships will enter drydock less often. They will still have a drydocking period at each IPER in order to repair the paint from the keel to the waterline. (The Aviso A69 class will drydock midway between IPERs, approximately every two and one half years.)

The approximate base price per day for a ship drydocked in Toulon (less than 20 meters long) is 2,970FF (\$540).<sup>12</sup> The average ship spends two

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<sup>12</sup>Costs are based on several factors, including security provided by civilians, operating the drydock, overhead costs, and equipment maintenance costs. There are 12 drydocks at the naval shipyard in Toulon and the fixed

weeks in drydock so the price to the Navy for just the time in drydock (not taking into account the actual docking refloating) is 41,580FF (\$7,560) [Ref. 16].

When a ship does enter its IPER, all work is supervised by the DCN.<sup>13</sup> But before a ship commences an IPER there is an inspection called the pre-IPER conducted by the SCMN<sup>14</sup> and the DCN to determine the work that must be accomplished (work that absolutely cannot wait until the next IPER). The Majorité Générale is responsible for paying the DCN in advance for the work to be accomplished during the IPER. It has a programmed annual budget that includes the price for the IPER. If there are any cost overruns, it is up to the Majorité Générale to shift funds from other programs to pay for the overruns. The SCMN is the Majorité Générale's arm and is responsible for assessing the quality of the work at the end of the IPER.

The Majorité Générale is responsible for the ships' upkeep plan. It submits the annual budget estimate to the Naval headquarters in Paris which is responsible for dividing the maintenance money among all its branches.

The need for cost-saving measures such as extending the IPER envelope can be seen when there is a budget shortfall. The amount accorded to Toulon for 1992 is less than that requested by the Majorité Générale; now it is faced with revising the upkeep plan for its ships. It has three choices: to

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costs for each of the drydocks are spread out based on the number of ships that are drydocked during the year.

<sup>13</sup>DCN (Direction des Constructions Navales)—Civilian branch of the defense department responsible for naval ship construction and weapon systems. (See Appendix A).

<sup>14</sup>SCMN (Service de Contrôl du Matériel Naval)—Unit of technically skilled senior petty officers. (See Appendix A.)

delay work, to deny particular work requests, or to cancel one ship's maintenance to shift money to more pressing work required on another. Money is stretched so tight that if a ship (because of an unscheduled mission) puts more hours on its engines than anticipated, the Majorité Générale will have a difficult time finding the money to pay for maintenance. It will have to once again face the same three choices [Ref. 17]. The possibility also exists that maintenance support (i.e., DCN) might not be available at that particular time because of the amount of work already in progress or because of long lead-time requirements in procuring parts [Ref. 18].

The French Navy has not kept central computerized records of ship material readiness. As each of the different regions Toulon, Brest, Cherbourg, and Tahiti is in charge of its own ships, no comprehensive compilations have been made to identify problems particular to a certain class of ship. This fact, coupled with the lack of a computer bank of historical data, places the French Navy in the very early stages of shipboard repair problem correlation and makes the scheduling of major upkeep maintenance a somewhat risky business.

### **C. AT SEA MAINTENANCE**

- 1. The French System of Reporting and Repairing Shipboard Equipment Casualties**
  - A. When a casualty to a piece of shipboard machinery occurs, the commanding officer sends a message to Service de Contrôle du Matériel Naval (SCMN).**

- B. SCMN investigates the problem (usually within 24 hours) and sends a message to either the AMF<sup>15</sup> or the Majorité Générale. If the AMF cannot accomplish repairs, the problem is left for the Majorité Générale to resolve.
- C. The Majorité Générale then assigns the work to the DCN of that particular port. The DCN usually handles the most difficult and urgent jobs.
- D. Once the repair to the equipment is complete, messages are sent to the various administrative and operational chains of command.
- E. Each Monday, commanding officers of ships are required to send a message to the Majorité Générale listing the equipment problems that still exist. The Majorité Générale is responsible for tracking the status of the equipment in order to effect repairs in as expeditious and inexpensive a manner as possible.

At the end of each month the Majorité Générale receives an *État de Dépense*. This is a bill sent by the DCN for all work performed by their organization for the Majorité Générale. Every effort is made to keep this bill to a minimum<sup>16</sup>, and so all work is meticulously scrutinized by the SCMN. When the DCN does the work, it is accomplished by civilians and it usually involves costly overtime. The SCMN is tasked to supply Quality Assurance (QA) inspectors at the completion of the DCN's work.[Ref. 19]

The SCMN arm of the Majorité Générale is also responsible for technical studies, and these are grouped into (1) machinery and (2) all other equipment. SCMN personnel, already highly technically skilled when they arrive at SCMN, augment their expertise by attending civilian factory training

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<sup>15</sup>AMF (Atelier Militaire de la Flotte)—Naval shore personnel who specialize in shipboard repairs. (See Appendix A.)

<sup>16</sup>The Majorité Générale tries, whenever possible, to assign jobs to the SCMN or AMF and to avoid the DCN.



sessions. Large ships such as aircraft carriers and cruisers have their own "experts" and do not usually use SCMN services. Ships from the Aviso A69 class on down call upon the SCMN to provide troubleshooting services.

The problem is that the various SCMNs do not work together to solve problems. They meet once a year to discuss problems, but this is not enough to compile and correlate data regarding technical difficulties in the fleet. Moreover, there is no standardization between them. When the SCMNs in Toulon and Brest conduct validation checks on the same type of diesel engine, it is not at all guaranteed that they will use the same methodology. There is no standard check list used by all SCMNs for the same material verifications (i.e., telling them which points to check and in what order). The French Navy believes that SCMN personnel are experienced enough to obtain the required results and therefore has not standardized their methods.[Ref. 20] However, this policy makes it difficult for one SCMN to compare results with another SCMN.

The SCMN has started tracking all shipboard problems in order to begin conducting correlation studies (e.g., are there problems common to a class of ships?). In Brest, the SCMN has begun to put its information on computers to establish the necessary data base for correlation. A similar effort is underway in Toulon; but the two SCMNs are not working together to set up the same systems to make compilation and correlation easier.

Another difference between the SCMNs in Toulon and Brest is their involvement in repair. Toulon tries to repair as much as possible in the area of weapon system and electronics (i.e., radars and television sets) using its own repair facility, and avoids sending work to the DCN. Brest, on the other

hand, has a different approach; it does not repair equipment and only investigates and provides repair recommendations.[Ref. 21 and 22]

A third major difference is in manning. The Toulon SCMN has more ships involved in operations, including France's two ageing aircraft carriers, and is understaffed. In the machinery area (i.e., pumps, engines) it has only 5 of the 9 required billets filled. The Commanding Officer billet was left unfilled for 3 months. This is significant since all equipment casualties, as well as pre-IPER and post-IPER verifications, are its responsibility. Brest does not have this problem; it is fully manned. In fact it is currently overmanned. This is because the Majorité Générale sends them personnel that are "stashed,"<sup>17</sup> thus providing valuable manual assistance to SCMN personnel.[Ref. 23 and 24]

Whenever a casualty to a piece of equipment occurs, commanding officers are required to report the ship's readiness status up the chain of command. This keeps operational and administrative commanders abreast of the mission preparedness of their units and informs the repair commanders of possible assistance that they might be obliged to render.[Ref. 25]

## 2. DCN Costs

The DCN employs government workers called POE (Personnel Ouvrier d'État). These are permanent employees that cannot be laid off.

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<sup>17</sup>"Stashed" personnel are those who for one reason or another are temporarily assigned to a command while waiting to report to their next permanent assignment. This is usually for a period of short duration, one to three months.

Their salaries are fixed costs for the DCN whereas the salaries of workers subcontracted from local industry can be considered variable costs. An increase in the amount of work brings an increase in subcontractors; less work means fewer subcontractors. Regulations governing the POE do not allow this sort of flexibility.

With the IPER interval change, the amount of work being given to the DCN is decreasing; but DCN costs to the Navy are rising. This is because the POE fixed costs (i.e., salaries) continue to rise and the number of POEs does not significantly change. In the last five years the number of POEs has decreased only slightly (a drop of approximately 1.6 percent) [Ref. 26]. The overall cost of a POE increases and that is passed on to the Navy as part of DCN costs. These costs are divided amongst the projects that the DCN does for the Navy. (See Appendix D.) In addition, if there are fewer projects (which is the case at the present time), the fixed costs must be divided amongst the fewer projects, and are allocated accordingly. The final project costs then do not necessarily reflect the specific work accomplished.

The DCN also maintains at least a minimum of subcontractors so as not to lose its resource pool. This sometimes leads to paying POEs who have done little, if any, work. [Ref. 27]

At the base in Toulon the amount of work for the DCN has decreased for the following reasons:

- a. An increase in the amount of upkeep work given to the crew.
- b. The contribution of the AMF and SCMN in accomplishing repairs.
- c. The assignment of some of the newer ships to Toulon and the decommissioning of the older ships.
- d. Budgetary constraints.[Ref. 28]

Since POEs cannot be fired or even moved from one region of France to another (except voluntarily), the fixed costs remain a burden to the Navy. If a POE does not wish to move to where there is more work (e.g., Lorient to Brest), he need not; he will continue to be paid.[Ref. 29] As a consequence the Navy must displace personnel and ships to try to maintain a certain amount of work in the various arsenals for the DCN. This contributed to the shifting of the Aviso A69 IPERs from Brest and Toulon to the DCN at Lorient.[Ref. 30]

### **3. Determining Sea Readiness: U.S. versus French Methods**

The U.S. Navy does not determine a ship's readiness for sea in the same manner as the French Navy. The U.S. determination is based on unit status<sup>18</sup>—that is, whether the ship's material condition and trained personnel are sufficient to meet all mission areas. SORTS (Status of Resources and Training System) is an evaluation, in percentage terms, of operationally ready equipment and of the personnel having the requisite training for conducting missions at sea. If there is a degradation of a ship's material condition exceeding 50 percent, the determination can be made to keep the ship tied up. (See Appendix B.)

The French Navy determines readiness at the squadron level. When a ship reports a casualty, the squadron commander looks at the upcoming mission for that ship and decides whether the casualty affects its ability to perform the mission. It is not as rigid a system as SORTS. A French ship could be so significantly degraded that it could not meet its normal mission

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<sup>18</sup>"The ability of a unit to perform the primary naval wartime mission areas assigned. The principal components are personnel, equipment/supplies on hand, equipment status, and training." [Ref. 31]

area, but if the assigned tasking were such that the breakdown of equipment would not have a disabling impact, the ship could still be ordered to sea.[Ref. 32]

The idea of keeping the chain of command informed as to the readiness of units is the same in both navies; the methodology employed is different. The discrepancy in the sizes of the two fleets helps to explain the difference. The French utilize a method which relies on direct contact between senior staff and individual units. Because the U.S. fleet is much larger, readiness determinations are made by commanding officers using the SORTS matrix. French-style "micromanaging" by senior staff is logistically impossible in the U.S. Navy.

#### **4. A Strategy for the Nineties**

In October 1990 the French Navy began what might be called a "Bump-'Em" Series of IPER (chaîne d'IPER) for the Aviso A69 class ships (20 in all, including 17 Avisos A69, 2 depot and support ships, and the *Albatros*). Originally the IPER was to be conducted in the major Aviso A69 homeports of Toulon and Brest. The French Navy had set the following parameters when programming the original cost of the new IPER sequence:

- a. The IPER site would be at a major Aviso A69 homeport so that the crew would not be away from its homeport and families while ashore for 6 months.
- b. There would not be a need for extra berthing support (i.e., a berthing barge) because the majority of the crew would go home in the evening.
- c. The crew would accomplish 2000 hours of upkeep work onboard the ship during IPER.

A political decision in response to the awarding of the *frégate de surveillance* (patrol frigate) contract to Saint-Nazaire (a decision discussed

further in this chapter) changed the IPER site from the two homeports to Lorient [Ref. 33]. This presented the Navy with the major problems of (a) maintaining crew morale while having an IPER out of homeport and (b) minimizing additional costs. The solution is unique, and the impact will not be known before the end of 1991.

The Navy decided to reassign the crew of the ship, a sort of "placing out of commission" during the IPER. When the *Détroyat* (the first in the series) arrived at Lorient, the crew turned over all of the ship's documentation to a detachment of six naval personnel assigned to the project. They placed all of this paperwork in vaults and took "responsibility" for maintaining the ship's documentation. The officers and crew were then detailed to new jobs in the Navy. The *Détroyat*'s IPER is supervised by the DCN at Lorient, and the DCN has full responsibility for the ship. A few weeks before the completion of the *Détroyat*'s IPER, the *Jean Moulin*, the second ship in the series scheduled for IPER, will arrive and conduct a turnover to the six-man naval detachment. The officers and crew debarking the *Jean Moulin* will then man the *Détroyat*, becoming her "new" crew. The IPER series will continue with each successively arriving crew debarking and then embarking on the departing Aviso A69. The second IPER series (chaîne d'IPER) is scheduled to begin in July 1991.[Ref. 34 and 35]

This system does take care of crew morale in the short run; the crew is not ashore away from homeport for 6 months. The long term effects are still unknown, but a very plausible scenario could come to pass. If an Aviso A69 spending a lot of time at sea due to operational reasons enters IPER, its crew could actually end up spending more time away from homeport than if

it had remained aboard during the IPER, for the "new" ship would most likely be the one tasked for operational missions—being in the best shape and having the least number of operating hours on its equipment. In addition, it would already have a highly trained crew.

An additional problem is that some Aviso A69 crews will change homeports when they change ships. The *Jean Moulin* comes from Brest, but when the crew changes to the *Détroyat*, they will also find themselves headed to their new homeport of Djibouti. Some ships will change homeports within France. Even though this is carefully orchestrated by the Naval headquarters in Paris, it will mean a cost to the Navy in terms of moving families.[Ref. 36]

The question of "additional" cost is still under investigation. The 2000 hours of upkeep work that was earmarked for the crew will now be accomplished by the civilian work force of the DCN. A study by French naval personnel is underway to determine what this additional cost will be. From an engineering plant operator's point of view, it is noteworthy that none of the crew will have observed the work that was accomplished on the equipment nor will any of the crew be familiar with the history of the equipment onboard that particular ship. This means a loss of historical "hands on" knowledge that usually proves quite valuable when troubleshooting equipment and systems.

An alternative and more equitable solution might have been to leave the crew aboard and to use military aircraft and/or ground transportation to bring the crew home to their families each weekend. Driving time from Lorient to Brest is approximately 1 hour, and flying time to Toulon is 3 hours. This system would have made the crew available for the earmarked work,

and they could have supervised the work being accomplished during the IPER. As stated earlier, the current system is under evaluation and the effects will not be known until at least the second ship completes its IPER and becomes operational (scheduled for the summer of 1991). During the *Détroyat* IPER the DCN has been surprised at how long it takes to do some of the basic seamanship labor that is normally accorded to the crew. By the time the *Jean Moulin* completes her IPER, the DCN will have developed a sufficient knowledge base to be able to accurately project the total cost of the IPER.

If all goes according to schedule, as the last ship in the Aviso A69 series finishes its IPER, it will be time for the *Détroyat* and the *Jean Moulin* to put in again and continue in the endless "chain" the French have in mind. [Ref. 37]

The Aviso A69 ships are dispersed throughout the fleet, with eight in Brest, five in Toulon, three in Cherbourg, and one in the Indian Ocean [Ref. 38]. In 1991 Brest will only have half of its Avisos A69 available. Four of them will in IPER at Lorient. The principal mission of these ships is coastal Anti-Submarine Warfare (ASW) operations. These ships complement the ASW frigates in assuring security for the Force Océanique Stratégique (FOST), the strategic nuclear submarines. Even though half of the Aviso A69 force will not be available, their missions still need to be fulfilled. There are two choices:

- increase the activity of the available ships, even though the norm has already been attained for the Avisos and surpassed for the frigates;
- take and utilize an Aviso from the division at Cherbourg. This will only shift the problem.



In either case, training and participation in exercises will again have to be greatly reduced until the return of the Avisos in 1993. [Ref. 39]

Two benefits of the Aviso A69 IPER system are already apparent. The first is that the Navy "gained" for reassignment the 90 personnel who were decrewed from the *Détroyat* when she first arrived at Lorient. This is important at a time when the Navy is experiencing manning problems.[Ref. 40] The second positive result concerns supply. When the *Détroyat* decrewed, everything could be taken off; and a complete and accurate inventory and validation of all supply parts was conducted. Since the Navy is able to physically verify all of the spare parts, it can also review their history and decide whether it is really necessary to put the parts back on board.[Ref. 41] This type of scrutiny never happens on manned ships because parts are "hoarded" in case they are ever needed.

A second political decision that has greatly affected the French Navy was the awarding of the frégate de surveillance (*Floréal* class) new construction contract to the Chantiers de l'Atlantique de Saint-Nazaire instead of to the government-owned Lorient Naval Shipyard. There will be a total of 6 ships of the class built at Saint-Nazaire. As these particular ships are designed to operate in low threat areas, the Navy decided to reduce their cost by constructing them to merchant marine regulations called SOLAS (Safety Of Life At Sea) and VERITAS.<sup>19</sup> This political decision came as a blow to the

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<sup>19</sup>SOLAS (Safety of Life at Sea) and VERITAS regulations are standard civilian vessel regulations. These ships (unlike military ships) are not required to withstand shockwaves from mines or have redundant electrical systems to minimize battle damage from missiles. They are required to meet certain damage control requirements for combating fires at sea. VERITAS is a

Navy because each ship represents 600,000 to 700,000 hours of work, and the Lorient shipyard is lightloaded and badly needs the work.<sup>20</sup>

The total cost of one frégate de surveillance is estimated to be 500 million francs (\$91 million).[Ref. 43 and 44] Because the ships are being built by a civilian shipyard, the Department of Industry (Ministere de L'Industrie) pays 60 million francs (\$11 million) of the construction to Saint Nazaire.[Ref. 45] The cost to the Navy for the Saint Nazaire fixed-price contract is 200 million francs (\$36 million). The *Floréal*, first of the six ships, took two years to build and was delivered on time.

The Navy was able to salvage a solid 10 percent of the work for the DCN at Lorient by awarding it the weapon systems installation package. Work by Lorient is not fixed-price but is negotiated based on 20,000 hours of work. The actual price will rise (or fall) depending on actual hours worked. The other 240 million francs (\$43.6 million) includes projected DCN work hours and the cost of outfitting the ship (i.e. radars, guns, bullets, etc.). [Ref. 46]

On the other five ships of the *Floréal* class, Lorient will have 20 to 25 percent of the work, with 10 percent of that on the superstructure [Ref. 47].

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civilian firm in France that approves civilian ship construction plans to verify that they meet standard safety regulations. Their certification is needed for insurance purposes. VERITAS approved the plans for the *Floréal* class ships and conducts checks at the shipyard throughout the construction process. [Ref. 42]

<sup>20</sup>To make up for the lack of work for the DCN, a second political decision was made to conduct the avisor A69 IPER series at the Lorient naval shipyard. This decision was reportedly contrary to the Navy's desires.

Saint-Nazaire was responsible for building *Floréal*, but the DCN and Saint-Nazaire engineers were supposed to work closely together during the construction process to minimize difficulties in the weapon systems installation process scheduled for Lorient. Unfortunately, this did not happen. Saint-Nazaire delivered a "completed" ship to Lorient, and now the DCN is cutting holes in the ship for weapons installation and cabling routes for the electrical connections. A close working relationship between Saint-Nazaire and the DCN would have minimized this "reconstruction" process. The lack of communication will entail a double cost to the Navy, because the Navy paid Saint-Nazaire to "complete" the ship and now it is paying the DCN to cut up the ship and put it back together.[Ref. 48]

The decision, at first glance, seems to have been made purely to save the French shipbuilding industry. If Saint-Nazaire had not been awarded the contract, the last of France's major civilian shipyards would have folded. But during the bidding process, Saint-Nazaire clearly underbid the DCN at Lorient, and in an era of budget cuts and weakening defense industries, costs as well as good lobbying play major roles in securing contracts. Saint-Nazaire built the *Floréal* on time (two years from signing of the contract to delivery) and will build the other five ships by 1993. It is doubtful whether the DCN at Lorient could have met this delivery schedule.<sup>21</sup> Saint-Nazaire specializes in

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<sup>21</sup>The *La Fayette* class of light frigates has a full load displacement of 3,200 tons, a length of 360ft, and a beam of 45ft. This class of ships has a cost per ship of about 1,100,000,000 francs (\$200 million). The *Floréal* class has a 2,950 ton full load displacement, a length of 307ft, and beam of 46 ft. The estimated cost of each *Floréal* class ship is 500,000,000 francs (\$91 million). These ships are built under different regulations (military versus SOLAS) and their

constructing ships under SOLAS regulations and desperately needed the work to survive (an incentive).[Ref. 50]

The French Navy has made a concerted effort in the last three years to improve the living conditions on her ageing ships. The average age of ships in the French combat fleet is 17 years, and comfort standards have changed during that time. Minimum living standards and a high noise level undermine—or have an adverse impact—on crew morale, but the French Navy does not have the necessary funds to make large improvements in habitability, although an effort is made to dedicate some funds at each IPER to ameliorating living conditions. [Ref. 51] Due to the lack of funds, work formerly accomplished by the DCN, such as painting berthing areas, is being accomplished by ship's crews during their IPER. The two aircraft carriers have received special funds ((20 million FF (\$3.6 million) for the *Foch's* 1991 IPER)) for improving the dining and sanitary areas. [Ref. 52 and 53]

There are other major concerns when it comes to the aircraft carriers. The *Clémenceau* is 30 years old and is programmed to remain in service until at least 1998 when the *Charles de Gaulle* becomes active. Already 28 years old, the *Foch* is expected to last until 2005 when she should be replaced by the

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weapon systems are not the same. These two facts account for some of the large price difference. But another significant difference is that the *La Fayette* class is built by the DCN in the Naval shipyards, while the *Floréal* class work is being accomplished by a civilian shipyard. The DCN is reluctant to give out information regarding shipbuilding and repair costs or the number of hours (projected or actual) for a construction project. French sources indicate that questions are being raised as to why costs are so high for work contracted to the DCN. [Ref. 49]

second nuclear aircraft carrier.<sup>22</sup> In 1995/1996 the *Foch* is scheduled for a one-year overhaul which has the estimated cost of 100 million francs (\$18.2 million). (See Appendix E.) [Ref. 54]

#### D. CONCLUSION

The question as to whether or not the increased interval between IPERs will produce the anticipated cost savings does not yet have a clear answer. The newness of the program and the lack of an engineering historical data bank prevent the French from making long range predictions at this time. One French source did in fact conduct an informal, private, one-year maintenance cost-evaluation study. He found that increasing the interval between IPER from 18 to 24 months produced a cost-savings gain of only 4 percent (versus the 27 percent straight-line expectation). Cost savings were not linear due to the rise in the expenses of everyday maintenance.

Expanding the time interval between IPERs before ensuring that it is technically sound to do so appears premature—"look before you leap." The French Navy clearly understands this potential liability but sees this method as the only viable option if it wants to start obtaining cost savings immediately. It does not have the luxury of a Naval Ship Systems Engineering Station (NAVSESSE)<sup>23</sup> with in-place equipment to investigate

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<sup>22</sup>The relief for the *Foch* is hypothetically because funds have not been appropriated for a second nuclear aircraft carrier. In order to have an operational relief for the *Foch* in 2005 funds must be appropriated beginning in the 1993/1994 time frame.

<sup>23</sup>NAVSESSE (Naval Ship Systems Engineering Station)—The U.S. Navy's principal test and evaluation center for hull, mechanical, and electrical (HM&E) ship systems and submarine antenna and periscope systems. If the

potential problems associated with such a decision. As one French source stated: "When the U.S. Navy builds a series of ships it builds 30; when the French Navy builds a series, it builds 6." [Ref. 55] The French Navy cannot afford to man and procure duplicate engineering systems to put in land-based test sites to replicate and investigate fleet engineering problems. The French Navy intends to proceed slowly in its attempt to push the envelopes of equipment maintenance. NAVSSES investigates these envelopes for the U.S. Navy and makes recommendations on whether to shift the envelopes. An alternative for the French Navy is to work with the U.S. Navy and compare envelopes for similar equipment. Sharing this information could lead to cost savings for both navies.

How far to push the limits of the envelope in order to widen the period between IPERs is the dilemma facing the French Navy today. The placing of vibration-monitoring equipment aboard ships is a very positive step in the right direction. Vibrations have a definite measurable effect on operating machinery. Unfortunately, the French Navy is only in the experimental stages in this field. It is, in fact, still in the process of evaluating which vibration monitoring equipment should be procured and installed. The short-term cost of obtaining and installing the equipment is large (approximately 85,000FF (\$15,455) per unit), but the long-term effect should be an increase in the equipment life cycle [Ref. 56].

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U.S. Navy tried to extend its IPER intervals, NAVSSES would be deeply involved because its function is to provide comprehensive in-service (shipboard) engineering support to operating forces.

The computerized recording of historical data such as vibration and equipment casualty for use in correlation and predictions is in the embryonic stage. There is currently no central data bank established for gathering this information. Individual commands such as the SCMN at Brest are purchasing their own personal computers in order to begin tracking this information. They are taking only minor steps to contact other SCMNs to try to gather and correlate information, but this needs to be a Navy-wide process. The SCMN organization throughout the Navy needs to be reviewed, and standardized procedures developed, in order to streamline the exchange of information.

The political decisions to conduct the Aviso A69 IPER at Lorient and to award shipbuilding contracts to civilian rather than naval shipyards have had an impact on naval long-range budget planning. While the Aviso A69 IPER could cost more than what was originally programmed,<sup>24</sup> and the construction contracts could produce a budget savings, the budget savings in the construction account may not be enough to offset the under-utilization of government-owned naval shipyards. The DCN had hoped to use the Aviso A69 IPER in the two shipyards to fill in the gaps between larger projects. Although the cost/benefit results of saving civilian industry over government industry will never be known, the French Navy on the surface appears to have come out ahead. In a four year time span the Navy will have

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<sup>24</sup>The total costs are still unknown. While the French Navy hopes the centralizing the equipment in one shipyard will produce savings, the POE fixed costs and subcontractor variable costs that will be associated with fewer projects at Brest and Toulon may actually produce a deficit.

six new frégates de surveillance, a feat the DCN at Lorient would have had difficulty in accomplishing.[Ref. 57 and 58]

In 1991 or 1992 the Assemblée Nationale is expected to discuss the new *loi de programmation* presenting the new military construction plan for the next five years. Although privately French sources agree that a second nuclear aircraft carrier is needed, no official decision has yet been made. The decision needs to be included in the new *loi de programmation* if the Navy is to have a chance of retiring the *Foch* by the year 2005 (at which time the *Foch* will be 42 years old). World events, such as the war in the Persian Gulf, have reinforced the desirability of maintaining a two aircraft carrier fleet.[Ref. 59]



### **III. CHANGING REQUIREMENTS, CHANGING RESOURCES: THE CHALLENGE OF PERSONNEL MANAGEMENT IN THE MODERN FRENCH NAVY**

#### **A. INTRODUCTION**

This chapter, which focuses on methods used or contemplated by the French Navy to deal with the limitations the 1990s will bring in the area of personnel management, will necessarily touch on some of the same areas covered in the second chapter, but the primary focus is on the labor side, L<sub>1</sub> and L<sub>2</sub> of the production function.

The intrinsically competitive nature of recruitment not only influences personnel management policies but at the present time is affecting everything from hardware design to long range strategic planning in the armed forces. The military is in competition with the private sector for its recruits (L<sub>1</sub>). While this situation presents the same basic challenges to the French military as a whole, each branch of the Armed Forces must decide individually how to cope with the ramifications of economic and political realities beyond its control.

The Navy has maintained a steady input of recruits but has problems reenlisting first term personnel, a failure that imposes grave financial burdens due to the high cost of training. Unfortunately, recruitment itself will become a greater problem in the 1990s due to a noteworthy decline in the birth rate. If the Navy is unable to maintain a sufficient reenlistment rate, it will be forced to recruit even more heavily from a dwindling manpower

resource pool in competition with other branches of the Armed Forces. This competition has forced the Navy to reevaluate the career (limited and long term) package it currently offers its personnel. The balance it achieves between wages and incentives (such as retirement benefits) and its other budgetary requirements will determine in part its success in managing personnel.

There is a significant difference in the cost to the Navy between a new recruit ( $L_1$ ) and a conscript ( $L_2$ ), but there is also a significant difference in the benefits they receive. This difference is projected to increase, since the length of service of the less trained, less qualified conscripts will be reduced in 1992 from an already minimal twelve months to ten. Further complicating the situation is the discussion since the war in the Persian Gulf, of an all-volunteer force versus a mixed force (professional service personnel ( $L_1$ ) and conscripts ( $L_2$ ) performing their national military service, or NMS). The immediate effect of this uncertainty is to discourage possible conscripts in an age group whose desire to be in the military is already often low. An actual change would pose tremendous problems for recruitment and financing, as will become evident. Conscription has its own drawbacks and benefits, and some of these are discussed below. The next section examines problems related to professional service personnel ( $L_1$ ). The following section examines NMS conscription ( $L_2$ ). The last section offers some concluding remarks.

## **B. THE BASIC PROBLEM: COPING WITH INTERNAL ATTRITION WHILE THE "FREE" EXTERNAL LABOR FORCE SHRINKS**

### **1. Rationale:**

The end strength of the French Navy in 1991 is composed of 46,197 professional service personnel, 19,098 National Military Service (NMS) personnel, and 7,130 civilian employees. The Navy makes up 10.8 percent of the total French military force.[Ref. 60] But major problems face the Navy in the recruitment of personnel, both professional and NMS. The number of available French men of draft age is decreasing and is expected to bottom out at a level of 355,000 by 1996. In fact the highest number of available 20 year olds between the years 1991 and 2006 will occur in 2001. In that year the expected pool of available men will be 397,000 and the actual pool will be 284,000.<sup>25</sup> The average age of men entering NMS is 20 years and 7 months. In 1989 the actual pool was 298,000 and the French military enlisted 10,338 new recruits and 251,316 NMS personnel.[Ref. 61] The French Navy needs 3,078 new professional recruits per year. (In 1990, 336 of the professional recruits came from personnel completing their NMS.) Ten percent is the norm for enlistments from NMS personnel.[Ref. 62]

### **2. Reenlistments**

The French Navy has been having problems getting first term personnel to reenlist. The qualified recruit is offered an initial enlistment

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<sup>25</sup>The available pool is based on the number of births twenty years earlier. The actual pool starts with the available pool figure and subtracts the number of personnel expected to be exempt from NMS for reasons of health, family, unusual circumstances, or prior enlistment in the military. Minimum age for NMS is 18, and service can be delayed until age 23.

contract of three years or five years, depending on his initial aptitude examinations. Those with the higher initial aptitude scores receive a first enlistment contract of five years. This contract is too short, in the view of some officers in the French Navy. An enlistee can spend up to a year of his first enlistment in naval schools. He attends seven weeks of operator training related to the operation of basic navy equipment. This training is called the Brevet Elementaire (BE) and it is taught at the Centre d'Instruction Naval (CIN) at Saint-Mandrier. Upon completion of the course, the recruit is stationed aboard fleet units for two years. After gaining some fleet experience, he returns to Saint-Mandrier for seven months of technician training. This type of training, called the Brevet d'Aptitude Technique (BAT), teaches Third Class Petty Officers (3/C POs) the basics of equipment maintenance and elementary troubleshooting. On a three year enlistment contract a person is guaranteed BE training; the five year contract guarantees BE and BAT training.<sup>26</sup> Between the training and leave periods of a five year contract, the sailor is effectively non-operational for a whole year. Moreover a large part of the remaining four years is spent gaining competence. This does not permit the Navy to get more than a minimal return on its investment.

Furthermore, the French Navy has concluded that the present short length of service actually encourages people to leave. Reenlistment at the end of a five year contract brings with it three to four more years at sea;

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<sup>26</sup>If a person under a three-year contract does well, at the end of his contract he can ask to reenlist and attend BAT training.

whereas some marketable skills acquired in the Navy can bring a larger paycheck in the civilian sector. (See Appendix F.)

Marketable skills are divided into two categories, non-transferable and transferable. Non-transferable skills are defined as those that apply only to the military (with very few opportunities in the civilian market). The military does not need to provide the same level of incentives to retain personnel holding these skills because there is no real alternative for these individuals. They either stay in the military and use their skills or quit and begin training to learn new marketable skills. For example, in the U.S. Navy's Selective Reenlistment Bonus<sup>27</sup> (SRB) system an individual whose skill is guns (Gunnersmate Guns—GMG) is only eligible for the award once during his career. This happens between the 21 months and 6 years active service mark (Zone A) and it has the lowest multiple (1). This is usually the point when an individual elects to attend specialized technical training. The

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<sup>27</sup>Selective Service Bonus (SRB)—A monetary bonus given to individuals when they reenlist in the Navy (but is not part of the reenlistment contract). The amount of money received depends on the amount of active service time the member has, his skill, and the amount of time he has agreed to obligate for. There are three zones in which he might be eligible to receive the award. Zone A occurs between the 21 month and 6 years continuous active service mark, Zone B between the 6 and 10 year mark, and Zone C between the 10 and 14 year mark. Depending on his skill he may not be eligible for all three zones. Each year the Navy transmits a message defining the multiples used for each zone in calculating the exact amount of award the individual will receive. Each skill has its own multiple for each zone. [Ref. 63]

U.S. Navy, by sending him to this training invests the minimum it needs to in order to keep the individual in the service.<sup>28</sup>

Transferable skills are skills marketable in the civilian sector, and the U.S. Navy must invest in greater incentives for personnel with these skills. For example Gas Turbine Electricians (GSE) have multiples for Zones A, B, and C, of 4.0, 4.5, and 3.0 respectively. The U.S. Navy has a hard time keeping these individuals in the service because there is a large demand for their skills in the airline industry. In order to entice them to stay, the U.S. Navy must offer a competitive compensation package.

As was noted in Chapter II, the French Navy makes capital investments, such as the IPER for the Aviso A69, in order to extend the service life of her ships. For the same reason the Navy must invest in its "human" capital. This investment can be more costly to the French Navy because it cannot be promptly replaced like an engine on a ship. It takes a considerable amount of resources (monetary, human, time) to train an individual to meet certain skill requirements. Once he is able to meet them, the French Navy needs him to utilize that skill level for a period of time at least long enough to train another individual to take his place.

As indicated in Appendix (G) on Career Profiles, the age limit for the Maître Principal (equivalent to a U.S. Navy Senior Chief Petty Officer—SCPO)

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<sup>28</sup>There are skills that are not readily transferable but still require continued investment because the Navy does not have enough personnel to fill required billets. The Boiler Technician (BT) skill is a prime example. This is not an actively sought job skill by the civilian sector but the Navy pays an award in all three zones. For Zone A the multiple is 2.5, Zone B 2.0, and Zone C 1.0. [Ref. 64]

and Major (Master Chief Petty Officer—MCPO) will most probably be raised to keep these highly skilled individuals in the Navy longer. The French Navy recognizes the need to extend the service careers of its personnel in order to use their advanced skills in extending the life of its equipment capital.

The need for the Navy to retain its personnel assets is growing ever more urgent, for the aircraft carrier *Charles de Gaulle* will commence its sea trials in 1996. It will have a ship's complement of 2000 men, and both commissioned aircraft carriers, the *Clémenceau* and the *Foch*, will still be in service. Thus the need for personnel will certainly grow in the Navy (unlike the Army and Air Force, which are both facing large reductions in personnel). At the present time, there is no budgetary provision for the increase in personnel necessary to man this carrier, so other ships may have to be decommissioned earlier than scheduled. Another alternative being considered is to strip other ships down to minimum manning levels. In either case, the need for qualified personnel will be of utmost importance.

### C. A REENLISTMENT STRATEGY: THE EIGHT YEAR SYSTEM

A new system is being introduced that has an eight-year first enlistment contract. At the end of eight years, those evaluated as unsatisfactory for further naval service will be separated and given a "prime" (comparable to severance pay) equal to 14 months pay. Personnel will be allowed to quit between the eight and eleven year mark and receive the "prime." Those evaluated as satisfactory will be given the opportunity to reenlist for a career. This will create two career patterns, one of eight years and the other a minimum of fifteen years. The advantage of the eight year system is that it eliminates one obstacle in the current reenlistment path.

In the five year system, an enlistee evaluated as satisfactory at the end of five years can reenlist for five more years. If he receives average evaluations, he can only reenlist for 3 years before requesting another reenlistment. The French Navy judges that an initial enlistment of five years is too short and makes the first term enlistee think too much about getting out. An initial term of eight years cuts out the hurdle of the five year mark. [Ref. 65 and 66]

There are disadvantages to the eight year system. This system could cost the Navy more for two reasons: first, in the new system a Quartier Maître will automatically advance to Second Maître (second class petty officer (2/C PO)) upon successful completion of the BAT<sup>29</sup>, and the difference in sea pay between a Quartier Maître and a Second Maître on a ship homeported in France is 729 francs (\$132) per month; secondly, the French Navy intends to lower the minimum age limit for Second Maître and Maître (First Class Petty Officer (1/C PO)) from 45 to 42 to encourage less than "average" personnel to quit between the eight and eleven year mark.<sup>30</sup> If a person reaches his age

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<sup>29</sup>BAT (Brevet d'Aptitude Technique)—elementary technical training where the individual learns basic skills for machinery maintenance and minor repairs. [Ref. 67]

<sup>30</sup>The French Navy is reducing the age limit because there are not enough Maître and Premier Maître billets in the French Navy. This system helps to selectively reduce numbers of personnel. This will act as an incentive for those who made the cuts to stay in the Navy. It is also the French Navy's intention to raise the maximum age limit for Maître Principal (Senior Chief Petty Officer) and Major (Master Chief Petty Officer) from 52 and 55 to 55 and 56 respectively. The maximum age limit is designed for those senior personnel who reach the lower age limit and want to stay in the Navy. The Navy can elect to keep the individual until the maximum age limit. The upper age limit for Second Maître, Maître, and Premier Maître is 50 years of age. [Ref. 68]



limit for his particular grade, he can ask to remain in the Navy and the Navy will review his record and possibly keep him until the maximum age limit for his grade. If the Navy does not approve his request, he will be obliged to resign. As mentioned earlier, those leaving between the eight and eleven year mark will receive a "severance" pay. This pay is a lump sum payment equal to his base pay for 14 months and is awarded to help the individual reintegrate into the civilian sector. For Premier Maître (Chief Petty Officer) the minimum age limit will be raised from 45 to 47 to keep these highly trained technical personnel in the service longer.[Ref. 69 and 70]

#### **D. IMPROVING THE MILITARY'S STANDARD OF LIVING**

The basic Navy pay scale is too low and the extra benefits too haphazard (or living and working conditions too onerous) to encourage enlistment. Personnel in the Navy receive extra pay depending on their stationing. An unmarried Quartier Maître (Third Class Petty Officer—3/C PO) has a base pay of 4,523 francs (\$822) per month. He receives a monthly sea pay of 1,131 francs (\$205) if he is stationed in France, 1,735 francs (\$315) if in the Antilles, and 3,150 francs (\$573) if in Djibouti. These are but a few of the examples of the difference in pay based on homeport.[Ref. 71]

It is difficult for a Quartier Maître to go from sea duty to shore duty (especially if he is thinking of getting married and starting a family). This is an oversimplification, but the problem is real, and young families with fewer

than three children<sup>31</sup>, have a difficult time surviving when the husband loses sea pay.[Ref. 73]

Since march 1991 the minimum wage (or salaire minimum interprofessionnel de croissance (SMIC)) in France is 31.94 francs/hour (\$5.81).[Ref. 74] In order for a civilian to make 5,654 francs (\$1,028) per month he would have to work 44 hours per week. If a sailor's normal workday begins at roll call (0730) and finishes at 1700, he works 47.5 hours in a five day work week. However, if one takes into account duty nights, weekend duty, and holiday duty, plus service 24 hours a day when underway, as well as the fact that being in the military means that one is always on call in an emergency, it is apparent that the Quartier Maître does not get paid the minimum wage.

The defense budget for 1991 shows that the French government realizes that it must try to raise the standard of living for the military. The *loi de finances* for 1991 earmarks 173 billion francs (\$31.5 billion) for just that purpose. Provisions of special interest to the Navy include:

- a subsidy to compensate for having 24 hours of duty on a Sunday or holiday (if the person is not given time off as compensation). The amount earmarked for this program is 168 million francs (\$30.54 million). Officers would receive 250 francs (\$45), Chief Petty Officers, First Class Petty Officers (1/C POs), and Second Class Petty Officers (2/C POs) receive 200 francs (\$36), and other enlisted personnel 150 francs (\$27).

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<sup>31</sup>There is a large increase in the "allocation familiale" (family allowance) paid by the government when a couple has a third child. The basic subsidy paid for two children is 599 francs (\$109) per month. With a third child the sum is 1,368 francs (\$249) per month. [Ref. 72]

- 185 million francs (\$34 million) will go towards paying a bonus of five percent to Chief Petty Officers, 1/C POs, and 2/C POs when they reach 5 years of service.
- 48 million francs (\$8.7 million) for 20 percent bonus pay for service in a war zone.
- the start of an increase to bring the salaries of junior enlisted personnel (3/C POs, seaman, seaman apprentice, and seaman recruit) up to minimum wage. The raise will have subtracted from it any bonus, including the 20 percent bonus of sea pay, to which the person is entitled (other than those benefits just listed).

It will take substantial financing, 115 billion francs (\$20.9 billion) and seven years to fully implement this plan.[Ref. 75]

#### **E. STRATEGIES TO MINIMIZE PERSONNEL SHORTFALLS**

The French Navy projects a shortfall of 1300 enlisted personnel in 1996.<sup>32</sup> Studies are underway to find a way to minimize the effect of this deficit on the fleet. One strategy, successful in Brest and currently under evaluation in Toulon, is the shore-based, exterior-maintenance team mentioned in Chapter II, for the most part made up of national military service personnel, under the direction of a squadron commander. Materials (paint, chipping hammers, etc.) are supplied by the Majorité Générale.

When a Captain knows that his ship will be in port for at least a two-week period, he can request this team from the squadron. The unit only works on exterior maintenance (chipping and painting). This allows the ship's company to concentrate on higher level mechanical maintenance.

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<sup>32</sup>This is based on having "three" aircraft carriers in 1996, the *Foch*, *Clémenceau*, and the pre-commissioning manning for the *Charles de Gaulle*. This problem is also projected to exist in the year 2003 with the *Foch*, *Charles de Gaulle*, and the second nuclear aircraft carrier.

A study, requested by the État-Major de la Marine and conducted by École de Guerre, looked into the possibility of separating operators and technicians into two separate "corps." The operators would be assigned to sea billets; technicians would be shore-based. This system has two major drawbacks: first, as operators would spend the majority of their time at sea, it would prove costly to entice a person to stay in the Navy if he knew that virtually his entire career would be spent at sea; secondly, a ship underway developing even minor equipment problems would be required to return to port for repairs. At present operators are also trained as technicians, so "minor" repairs are handled at sea. The conclusion the study drew is that this particular system would not be beneficial to the Navy. It is therefore no longer under consideration.[Ref. 76 and 77]

As noted in Chapter II, the French Navy is in the process of developing a technical assistance team to help with the minimum manning problem aboard ships. This team will be shore-based and composed of technically competent senior enlisted petty officers. Commanding Officers will obtain assistance from the team by requesting them from the Majorité Générale via their chain of command. This team is programmed to be operational in 1992.

### **1. Retirement**

In the French Navy an enlisted man can retire from the Navy with 15 years of service and receive his retirement salary at once. (If an officer retires at the 15 year mark, he will not begin to collect his retirement until he is 50 years old. If he retires with 25 years of service, he starts to collect it at once.) Retirement pay is a percentage of base salary; the actual percentage is

calculated using a system of "annuités." The number of annuities the officer or enlisted man receives depends on his duty station and tasks.

1 year of service on shore = 1 annuité

1 year of service on a ship = 1.5 annuité

1 year of service overseas = 2 annuités

1 year of service on a submarine = 3 annuités

1 year of service on aircraft = 3 annuités

The maximum number of annuités a person can receive is 40, which equals 80 percent of his base salary for retirement purposes. This is paid in monthly installments.

An enlisted man stationed on submarines for most of his 15 years can retire after 15 years with 80 percent of his pay. This system encourages highly skilled personnel in the critical areas of submarines and naval air to retire while still young to begin a second career, and it makes it difficult to keep vital trained personnel in the Naval service. [Ref. 78 and 79]

Debates have begun in France concerning the retirement system for civil service workers. At the present time there is a movement to equalize all of the various retirement systems for French government workers. Currently, civil service workers cannot receive their retirement benefits until they are 50 years old, so equalization would put an end to enlisted men receiving benefits immediately following their 15 years of service.[Ref. 80]

## **2. National Military Service**

President Mitterrand announced on July 14, 1990 that the length of conscription for national military service (NMS) would be changed in 1992 from twelve months to ten months. This came as a surprise to the Minister

of Defense, Jean-Pierre Chevènement, who only the day before had expressed some reservations about changing the system. The reduction, he felt, would cause a deficit in the forces if it were not covered by an increase of 30,000 long service volunteers (VSL).<sup>33</sup> One reason for this is to cover those periods where very few people volunteer for NMS.<sup>34</sup> "One can presume that the rapid conclusion of the Soviet/German negotiations, accomplished without Allied consultations, favored the definition of decisions by certain politicians who had long had such ideas in their files—that is, to reduce the length of the national service and the size of the army." [Ref. 81]

National military service was first created in 1798 but was abandoned during the 19th century. Although it was back on the books in 1872, it did not become national conscription until 1905. It was then, and continues today, to be a subject of discussion.[Ref. 82] At present the effort is to make NMS more attractive. The French have already added a new benefit package, and some forms of alternative civil service are under consideration. The projected lengths of service are: ten months for the military, twelve months for the police and gendarmerie, and eighteen to twenty-four months for voluntary

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<sup>33</sup>Long Service Volunteers (Volontaires pour un Service Long) (VSL) are personnel who instead of serving for the normal 12 month period, volunteer to stay for an extra 4 months to a year.

<sup>34</sup>Traditionally a person completes the school year in June and then vacations during July and August. In September the conscript reports to begin his NMS. He completes his NMS twelve months later and then is available to join the civilian work force. Since the NMS system permits a conscript to choose the date he begins his NMS, it is expected that he will still choose September. The ten month system has him finishing in early July with no expected relief. Therefore, the military is depending on the number of VSLs increasing to fill the gap.

civil service overseas. The civil service system would permit teachers to continue teaching, and student airline pilots to continue training and then go onto reserve status. Different thresholds of physical aptitude would allow some men to be considered for technical and administrative duties. This plan has not yet been approved by either the President or the National Assembly.[Ref. 83]

The benefit package being offered to the conscripts is as follows:

- A discharge payment (or severance pay) of 350francs (\$64) at the end of NMS.
- Free transportation on the TGV (train à grande vitesse—rapid train)
- Salaries for the VSL raised from 1,400 francs (\$255) to 2,100 francs (\$382) per month.

A negotiation now occurs between a future conscript and the Direction Centrale du Service National (DCSN).<sup>35</sup> A feature of the benefit package for the 1990s will permit the future conscript to submit a preference, ranking in order:

- When he will serve.
- Where he will serve.
- What type of job he will have.

The DCSN plans to have a comprehensive information system in place by 1995 to let future conscripts know which jobs will be available. They will then be able to reserve a spot, much as they now reserve a seat on trains. The minister hopes to increase the number of VSL personnel from 20,000 to 40,000 by increasing their pay to 3,000 francs (\$545). [Ref. 84]

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<sup>35</sup>DCSN is the office that manages the National Military Service for the French government.

The Navy projects that a ten-month NMS will result in increased costs. It bases that conclusion on the following figures:

- At present, a 17 percent attrition rate means the Navy must recruit 19,300 men to fill 16,500 NMS billets.
- Assuming that the number of billets remains constant, the new ten-month conscription will force the Navy to recruit 23,200 conscripts each year. This is an increase of 3,900 conscripted (L<sub>2</sub>) required to cover the two month reduction in service.
- The length of service reduction plus the 3,900 man increase will produce added costs for:

Social Services/Health Benefits <sup>36</sup>	25.1 million francs(\$4.6M)
Recruit Training (3,900 X 7,000FF)	27.3 million francs(\$4.9M)
Severance Pay (3,900 X 350FF)	.1 million francs (\$0.2M)
Clothing/Food (3,900 X 3,500FF)	13.5 million francs(\$2.5M)
<b>Total Cost</b>	<b>67.0 million francs(12.2M)</b>

This is a significant increase in a time of fiscal constraints.[Ref. 86]

The announcement by President Mitterrand on 14 July 1990 makes it difficult for the DCSN to manage NMS resources. The available pool of eighteen-year-olds is currently constrained, and by law the DCSN cannot call up people younger than eighteen. There are concerns that many eligible young men will try to put off their military service until the ten-month obligation becomes law. Should this scenario come to pass, the financial

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<sup>36</sup>When a person enlists in the French military, the first twelve months of service count as his NMS obligation and he is paid as a conscript. At the end of his NMS he begins his military "career" and receives the salary of an enlisted man. A reduction from twelve mths to ten months would have him complete his NMS two months earlier; therefore his "costs" to the military would begin two mths earlier. [Ref. 85]



burden to the military will be greatly increased. The number of VSL's will have to be increased, and those enlisting in the military will start to receive their benefits two months earlier. In addition, the projected savings brought about by decreasing the end strengths of the armed forces (by approximately 30,000) will not be enough to make up for the increased costs of the VSLs and earlier active-service pay to the first term enlistees.[Ref 87]

From 1982 to 1989 the number of first term enlisted personnel in the French military decreased fifty percent (from 20,750 to 10,340). The number of VSLs decreased twenty-four percent between 1986 and 1989.[Ref. 88] While the Navy had some fluctuation between 1985 and 1989, overall there was a significant decrease in VSLs during this period. This decrease makes it difficult to count on the VSLs to make up for the lack of NMS personnel a ten month system will bring about.<sup>37</sup>

	1985	1986	1987	1988	1989
Professional First Term Enlisted	2616	1774	1976	1928	2897
Long Service Volunteers (VSL)	3625	2504	2077	2271	1489

The number of first term enlisted is approximately the same in 1985 and 1989, but the number of VSLs is half.[Ref. 89] If the required number of first term enlisted remains constant and the VSL downward trend continues, the Navy will be forced to increase NMS recruits. Increasing the number of first term personnel, however, would require a greater increase in the budget than increasing the number of VSLs.

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<sup>37</sup>The Navy attributes the decrease to a lack of an active recruiting effort. It is trying to change and make VSL recruiting a priority.

Although the projected population resource pool for recruits and NMS personnel will decrease, the levels are projected to remain high enough not to affect either the enlistment or NMS conscription pool enough to hurt Navy recruiting. During the 1970s the birth rate in France declined dramatically. 434,000 males were born in 1971; 355,000 in 1976. It is this pool that is coming of age for NMS.[Ref. 90] The number of projected recruits is estimated to be 10,000 per year and the number of personnel that will be excused from NMS (for social reasons) is approximately 20,000 per year. Subtracting this 30,000, even in 1996 when the 1976 generation turns 20 (the mean age for NMS), will leave a large enough resource pool to draw from (325,000) considering that in 1989 the budgeted number of NMS personnel fixed by the *loi de finances* was 251,316.

### 3. The Question of an All-Volunteer Force

A poll conducted for the French Military Information Service (Service d'Information et de Relations Publiques des Armées—SIRPA), by the SOFRES polling organization, in 1989 asked the question: "Could France defend herself without the national military service?" Sixty percent of the people responded "no" and thirty four percent said "yes." [Ref. 91] This, according to the SIRPA, has been the belief since 1975.<sup>38</sup> *Le Point* magazine conducted the following poll in March 1991 with the following results:

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<sup>38</sup>The poll was conducted from 1 to 6 June 1990 by SOFRES. A nationwide sample of 1008 people 18 years of age and older was taken. Of the sample 47.5 percent was male and 52.5 percent female. The sample population was categorized by sex, age, profession of the head of the household, and region of the country based on population density. [Ref. 92]

(Q) Are you for or against a reduction in the length of military service?

- For 61%
- Against 35%
- No opinion 4%

(Q) Are you for or against a national defense organization in France that replaces national military service with an all volunteer force?

- For 66%
- Against 27%
- No opinion 7%

(Q) Are you for or against a system that permits variable lengths of service for those in the NMS based on their duty stations and assigned tasks?

- For 78%
- Against 15%
- No opinion 7%

In a similar March 1989 poll, 62 percent of the people polled preferred the system of the all-volunteer force.[Ref. 93]

The SIRPA and *Le Point* polls ask leading questions and give no alternatives. The question that has not been raised is: "Do you support paying for an all-volunteer force?" Since the Gulf War, most French newspapers have been questioning the utility of having a national military service, but only discreetly discussing the cost associated with the alternative.

At the outset of the Persian Gulf war, President Mitterrand decided that only the professional military would participate in combat operations. This decision, that no personnel involved in their NMS would be sent to the Persian Gulf, created problems for the military. According to a French official

writing under a pseudonym, ". . . conscripts comprise 55 percent of the Army, 26 percent of the Navy, and 37 percent of the Air Force." [Ref. 94] The military response to the Presidential directive was to offer those conscripts serving in units being sent to the Persian Gulf an "enlistment" for the duration of the war.[Ref. 95]

Prior to the war in the Persian Gulf, French ships were considered "French territory"—meaning that NMS personnel stationed aboard could serve in war zones because they were still on "French territory." When President Mitterrand made the announcement to exclude NMS personnel from participation in the war, it presented the Navy with a serious manning problem. This announcement affected 1600 NMS personnel in the French Navy. The Navy was obligated to move its ships out of the war zone while resolving the situation. The solution was to offer NMS personnel an enlistment contract for a 3-year obligation—with the caveat that the enlistee can terminate his contract anytime after he completes his initial NMS (normally 12 months; 18 months in the case of a VSL). Of the 1600 affected, 822 volunteered and 778 had to be replaced by regular enlisted personnel. Shore establishments and ships not involved in the conflict were stripped of personnel to replace the "non-volunteers," thus causing hardships throughout the Navy. Some equipment casualties occurred because the regular enlisted personnel were not used to doing the routine work that the NMS personnel had been trained to do. In addition, some ships were not able to get underway properly because their transferred enlisted personnel had been replaced by NMS personnel.[Ref. 96]

There is one immediate problem the special 3-year contract signed by NMS volunteers presents, i.e: having no way to determine when the 822 will terminate their contracts, the Navy has no way to schedule their replacements. But there is no immediate added financial cost to the Navy; in fact, the 822 "new" professional personnel should ease recruiting efforts during the three year period. If, however, the Navy turns down potential enlistees that would have made the Navy a career, the short run gain might prove to be a long run loss. [Ref. 97]

Jean Schmitt states that a powerful precedent has been set by not permitting conscripts into the war zone.

"François Mitterrand's unopposed decision not to send conscripts to the Gulf subjects the military to two irreversible conditions: the totality of the FAR must consist of only professional military personnel, and there should be attached to it an easily deployed armored division with its own logistical support also staffed by professionals.<sup>39</sup> And now you have the design for two Armies: a rapidly deployable mega-FAR staffed by "pros" for external duties, and an interior army composed mainly of conscripts.[Ref. 98]

Since the changes in Eastern Europe and the outbreak of the Persian Gulf War, it has become clear that a future war is more likely to involve defending overseas interests rather than the French homeland. Thus, with 55 percent of the army composed of conscripts, the "two army" concept seems

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<sup>39</sup>FAR (Force d'Action Rapide)—a strong professional force made up of 47,000 to 54,000 men divided into five divisions. The FAR can participate directly in the defense of France and can work with France's allies in times of crisis in Europe in a conventional war. In addition the FAR can be called upon to represent France overseas and to safeguard France's interests in times of peace. It is essentially an Army rapid deployment force. [Ref. 99]

unworkable. But in order to really comprehend the problem that an all-volunteer force poses, the costs must be examined.

Each year there are 250,000 conscripts in the French military. The average cost of a conscript is 17,500 FF (\$3,182), yielding a total bill to the country of 4.38 billion francs (\$800 million). The average cost of a first-term enlistee is 150,000 FF (\$27,273). Taking the 250,000 billets and converting them into recruits, yields a cost of 37.5 billion francs (\$6.8 billion). And this total does not even consider the cost increases that would be required to make the military attractive enough to recruit the necessary personnel.[Ref. 100]

A quick look at the all-volunteer British military shows the huge costs that can be incurred. Currently there are only 10,000 new enlisted recruits per year in the French military, and their salary is below minimum wage. The British military must recruit 27,000 personnel each year to maintain a total endstrength of 305,000 men. British military personnel receive higher salaries and incentive pay than do their French counterparts. Additional monthly pay is given to specialized British personnel such as Army Airborne and Navy SEALs. This pay varies between the equivalent of 6,300 francs (\$1,145) for a private to 10,000 francs (\$1,818) for a corporal. The French have calculated that even if officer and enlisted salaries were to remain the same, the budget increase required in TITLE III to pay the salaries and social benefits for an all-volunteer military would be 11.5 billion francs (\$2.1 billion). They further estimate an additional cost to the Navy and Air Force of 600 million francs (\$109 million) to pay for the amelioration of living conditions. (The cost increase for the Army would be covered by the greater reduction in forces.) Changing to an all-volunteer force would yield certain

savings, such as eliminating the railway (SNCF) expenditure of 1.1 milliard francs (\$200 million), but the changeover is estimated to have a minimum overall cost of 11 milliard francs (\$2 billion). This is 5.7% of the defense budget for 1991, and 12 % of TITLE III.[Ref. 101]

The French Navy's TITLE III account (which includes salaries, health benefits, and maintenance and upkeep), as a percentage of the total Navy budget, increased slightly from 1990 to 1991 from 35.9 percent to 36.61 percent (before the transfer of 540 million francs (\$98.2 million) for upkeep from TITLE III to TITLE V). The Operations and Maintenance (O&M) account also rose 1.5 percent between 1990 and 1991. The problem, as discussed in Chapter II, is that the overall cost of repairs also continues to rise, preventing the French Navy from dedicating sufficient funds for maintaining or upgrading habitability in its fleet. Living conditions are very important in maintaining morale; and a continuation of this trend will not support a good recruiting program for the Navy, especially when the armed forces are faced with cuts in service lengths for conscripts and the possibility of an all-volunteer force.

#### **4. The Hidden Costs of Conscription**

The introduction to the thesis discussed the production function (Q), stating that it is dependent on three variables: capital (K), professional service labor ( $L_1$ ), and conscription labor ( $L_2$ ). This conscripted labor, normally thought of as free labor, actually has real, but often hidden costs associated with it.

Each year the *loi de finances* budgets for approximately 250,000 NMS personnel. This large and highly diverse group ranges from those who lack job skills to those, such as engineers, with high job skill qualifications. While

those lacking job skills actually benefit by being in the military (and if an individual does well, he may request enlistment in the military), the highly trained must forgo one year of a career for NMS. Their personal loss can also be a loss to society as a whole, for the individual will most likely not be working at his optimum level of productivity during NMS (i.e. working in the field of his expertise).

The Direction Centrale du Service National (DCSN) is trying to minimize the loss of this productivity by offering prospective conscripts a chance to participate in the decisions about when, how, and where they will do their military service.

As well as the loss of individual productivity, there are other hidden costs to NMS. One such cost discussed earlier, under the heading of *National Military Service*, is that of the incentives which have to be offered to attract a greater number of VSLs ( $L_2$ ).

The government hopes to increase  $L_2$  in order to make up for the manning shortfalls of the professional service ( $L_1$ ). In the case of naval output ( $Q$ ), increasing either  $K$  or  $L_1$  will increase production. For example, if the Navy spends more money on ship upkeeps ( $K$ ), it will extend the life of the ship, as will increasing the number of long-term professional service personnel ( $L_1$ ) who are more experienced with the maintenance of the equipment. However increasing  $L_2$  much beyond the present level may actually cause production to decline. Although on the surface  $L_2$  appears to be "free," in fact it can be a liability to the military. Too many short-term untrained people cause the military to spend more  $L_1$  resources on training



L<sub>2</sub> at a time when the French Navy is experiencing shortfalls in recruitment and reenlistment.

An alternative to using NMS personnel is to contract out the work to a civilian firm. In the long run more work may be accomplished in a shorter amount of time, thereby increasing the overall longevity of the ships. (This frees L<sub>1</sub> to fill the manning gaps in other areas of the French Navy). The overall cost savings in terms of releasing L<sub>1</sub> personnel to more productive pursuits and extending ship life times might offset the cost of contracting out the work. The counter-proposal can be phrased as a question: "Why contract out when there is 'free' labor available to do the work? After all, ships will always need exterior upkeep and conscripts need to be employed."

But one possible benefit to the ongoing discussions of an all-volunteer service is that everything hitherto taken for granted has been put into question, and considerations such as the cost-effectiveness of NMS labor might get a totally new evaluation.

## F. CONCLUSION

The maintenance of a high reenlistment rate is crucial to the survivability of any military establishment, for the costs of recruiting and training are high, and the military needs to get the most out of its investment. A short initial contract, which discharges a recruit just when he has learned his trade, gives the military no more than a minimal benefit from its investment and in fact encourages the military not to invest as heavily in its personnel. This leads to more capital intensive defense production. However, to maintain a high reenlistment rate, the compensation package offered by the Navy must be competitive with that

and (in the case of NMS one year conscripts) on finding meaningful tasks for these individuals.

The Navy has two basic problems: the rising cost of construction/repairs and a lack of enlisted personnel. These two problems are important factors in any decisions involving long or short range programs. For example, the *Floréal* class of ships is built under civilian (SOLAS) regulations and uses a minimum manning concept (i.e. to automate as much equipment as possible in order to reduce the required manning level). In addition, older ships are getting assistance from a mainly NMS shore-based exterior-hull maintenance team (and in 1992 the shore-based technical-repair-assist team). Generally there appears to be a substitution of K and L<sub>2</sub> for L<sub>1</sub>.

When projects such as the hull maintenance team are decided upon, little or no consideration is given to alternative sources of labor as long as NMS provides a cheap labor supply. Yet how effective is the hull maintenance team? Is there, in fact, another alternative to using this supposedly "free" labor force that could still achieve the same objective?

This team is composed primarily of NMS personnel with professional service enlisted men responsible for them. Chipping and grinding a ship's hull, then smoothing, and finally priming and painting the area is very labor-intensive work. A conscript who perhaps did not "voluntarily" enter NMS duty, with his "benefits" being only food and shelter, is probably not going to be very productive. Is this the most efficient (in the sense of the correct mix of resources to produce optimum readiness) system for the Navy to use? This system requires L<sub>1</sub> to manage and motivate

which the enlisted man can obtain on the outside. The package must also be tailored to meet the Navy's manning levels so that at certain intervals there are sufficient personnel who leave the Navy to prevent it from becoming too "top-heavy." The current practices—including (a) not devoting sufficient funds for upgrading habitability and (b) paying new recruits less than the minimum wage—does not entice enough to stay in the Navy.

The idea of creating a longer initial contract is a positive move towards solving the reenlistment problem. If the Navy is able to keep a person for eight years, the chances of getting him to reenlist are increased. With the incentive offered between the eight and eleven year mark, the Navy hopes to assure itself of having enough personnel for the number of billets it will have open. Depending on the particular program, some enlisted personnel can retire after fifteen years of professional service. Unfortunately, this retirement system appears to encourage skilled personnel to leave and start new careers.

The current debates on national military service are quite heated. The utility of the system sometimes appears questionable when one considers the implications of taking young men out of the civilian work force for a year to work in areas other than those for which they have been training. This system yields less than optimum productivity for society as a whole. But as a budgetary question for a country that wants to maintain global presence, the national military service has some merit. Given that France wants to maintain her current military capabilities, the cost of doing away with a "free"

labor force and paying new recruits to take their place would be substantial.<sup>40</sup> Even the reduction in 1992 from twelve months to ten months is going to be quite costly. But political considerations and public sentiment will also play a role in the decision. Michel Rocard, the Prime Minister in 1988-1991, expressed the Socialist party's egalitarian philosophy and referred to the national interest when he stated: "The tradition of a conscripted army is very strong in France, and the country would lose a lot if it were renounced." [Ref. 102]

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<sup>40</sup>Exactly how substantial the cost would be depends on exactly how much  $L_1$  is paid. Remember  $L_1$  and  $L_2$  have very different paybacks. If, for example,  $L_1$  is paid to ten  $L_2$ s but his pay is only equal to five  $L_2$ s then he is a bargain for the Navy.

## IV. CONCLUSION

### A. PRESENT PERFORMANCE AS AN INDICATION OF FUTURE RESULTS

In an attempt to assess the French Navy's resource management policies and its ability to meet global military missions in the future, this thesis has examined the critical areas of shipboard maintenance and personnel management. The economic model of a production function was adopted as a useful framework for discussion. Naval output (defined as readiness to accomplish military missions) was assumed to depend on two primary resource inputs, physical capital (ships, fuel, maintenance parts, etc.) and labor (professional service and conscripts).

Chapters II and III survey the problems currently faced by the French Navy in trying to manage these resources under existing budgetary constraints. It is clear that the French Naval establishment is aware of the vital importance of these areas and has taken steps to devise novel and effective strategies to blend the two inputs. The Navy's willingness to innovate and constantly reassess policies regarding capital and personnel input combinations bodes well for the future.

The recent performance of the French Navy indicates flexibility and an ability to tackle and overcome problems. A static or straight line projection from the present situation might therefore be misleading. The situation is far from static. Due in part to the uncertainty about the future of conscription, or national military service (NMS), all programs are being reevaluated. What

follows is a summation of the present situation as it relates to the specific questions raised in the introduction.

- a. The French Navy is likely to continue to extend the time lag between IPERs to the extremes of the equipment envelopes (the maximum point before damage occurs). The long term effect is unknown. By dropping unnecessary (and destructive) routine maintenance, equipment life could be extended and long-term cost savings achieved. Short-term cost savings will be achieved through the reduction of man hours sacrificed to unnecessary maintenance. Everything depends on the ability of the Navy to determine how much maintenance is "necessary." Moreover, this program suffers from a significant drawback since the French Navy does not have a system of computerized equipment tracking that permits it to easily know what has happened to the equipment and produce real time tracking information. Almost everything is done manually. The lack of coordination between verification and maintenance activities will prevent the Navy from realizing potential cost savings by correlating problems in ships of the same class or problems with the same type of equipment.
- b. TITLE III funds have remained steady for the last two years and are not scheduled to be reduced further, but the O&M accounts in TITLE III will have less and less buying power as the cost per project from the DCN continues to increase. These costs will leave less money for the Navy to spend on personnel compensation such as habitability. The older the French fleet becomes, the more habitability upkeep costs increase. This could have a damaging effect on crew morale and could hinder recruiting and reenlistment, making the Navy more dependent on NMS personnel at a time when the Navy needs to increase enlisted personnel in order to man the ships presently being constructed. It must be added, however, that the *loi de finances* for 1991, which earmarks 1,729.824 million francs (\$314.51 million) to increase military benefits, shows that the French government realizes that it must try to raise the standard of living for the military.
- c. At the present time it appears that the French Navy will face difficulties in meeting all of its upcoming manning requirements. No increase in personnel has yet been authorized to help with the manning of the aircraft carrier *Charles de Gaulle*, which begins sea trials in 1996. The same issue will arise again for the second nuclear aircraft carrier in the years 2002/2004.

## **B. PROBLEM AREAS DEFINED; RECOMMENDATIONS**

It is always difficult for individuals brought up in one culture to understand fully what goes on in another culture. American ways are not French ways. The French Navy does not function exactly like the U.S. Navy, nor should it. For example, the difference in size of the two fleets warrants a very structured approach to problem solving in the U.S. Navy, while the French Navy can rely on more on ad hoc solutions. Cultural differences also come into play in the reliance on different methods of problem solving. For example, from an American point of view, it appears that the French Navy's innovative strategies to obtain a more cost-effective Navy could be jeopardized without steps to improve communication, command oversight, and coordination of projects.

As an example of coordination and communication difficulties on a higher level, two recent political decisions have had an enormous impact on the French military and seem to have been made without consultation with the military hierarchy. During the Persian Gulf crisis President Mitterrand made the decision not to send conscript personnel into the war zone. His decision necessitated a large amount of reorganization and improvisation in the military at a time of impending war. According to published French sources, for the Navy this decision meant pulling ships out of the Gulf, restructuring the manning aboard all naval units that would be sent (i.e. substituting  $L_1$  for  $L_2$ ), and effectively preventing some ships from getting underway due to a lack of qualified personnel.

The Presidential decision has also set a precedent which seems, at the present time, to necessitate either the establishment of additional professional

military units suitable for overseas operations or a change to an all-volunteer force. Either of these transitions would be costly and both are currently being debated by the Assemblée Nationale.

The second political decision made without military consultation was the decision to reduce the duration of conscript service from twelve to ten months. There is a desire on the part of some Socialist politicians to further reduce the length of service to six months. (The goal of reducing conscript service to six months has been a declared aim of the Socialist party since 1981.) It seems that French military authorities are currently uncertain how to handle the situation.[Ref. 103]

Conscripted labor  $L_2$  is considered "free," meaning that the Navy does not have to pay as much for this labor. The conscript  $L_2$  provides some contribution because he has enough time to learn a skill and then to use that skill productively. The marginal productivity provided by employing one more conscript is positive to the extent that he provides some benefit to the Navy. The same marginal productivity is not provided if the duration of service is shortened (it may result in negative marginal productivity). A shorter conscription for some  $L_2$  means that there is no longer "free" labor for the Navy. Gaining one more conscript might actually reduce the output (readiness) of the Navy, since it will take more of the Navy's ( $L_1$ ) resources to "make work" for  $L_2$ , thereby leading to a reduction in readiness. The high  $L_2$  turnover rate will cause  $L_1$  to spend more time supervising  $L_2$ , giving  $L_1$  less time to work in its own skill areas. In order for this not to affect readiness the Navy could be compensated in the form of an increase in professional personnel endstrength. This would allow the French Navy to have enough



trained personnel to accomplish both its global missions and the supervise of conscripts.

Political decisions are often totally beyond the military's influence, but an important aspect of the naval establishment is potentially more controllable. The DCN is a semi-autonomous unit, and the lack of free and open communication channels between the DCN and the Navy leadership seems to complicate sound management of the Navy's maintenance budget. Given the current fiscal situation, it would appear desirable for the Navy if DCN work rules were relaxed. Stronger high level command oversight involving Navy/DCN projects might also be beneficial.

For example, the awarding of the *Floréal* class shipbuilding contract to Saint-Nazaire caused employment problems for the DCN. The DCN's unwillingness (or perhaps their inability under current work rules) to displace employees from one shipyard to another (e.g., Lorient to Toulon) created hardships for the Navy. In particular the Navy was obliged to shift the Aviso A69 IPERs from their homeports of Toulon and Brest to Lorient in order to create employment there.

The movement to Lorient caused the Navy to reconsider its resource management policy to obtain maximum productivity from personnel as well as proper upkeep for its ships. Crew morale was the catalyst for the changes. The Navy knew it could not keep its crews away from their families for five months. Instead, the Navy decided to decrew the ship and to pay the DCN to accomplish the work originally earmarked for the crew to do during the IPER. This strategy not only has a monetary cost, but also a cost in terms of a loss of

"hands-on" historical knowledge of the ship and its equipment, because none of the men that will crew the ship will be aboard during the IPER.

The monetary cost may be high because the Navy has been unable to extract exact cost estimates from the DCN. The DCN's costs keep rising (i.e. a POE's salary is automatically adjusted for inflation) and these costs are routinely passed on to the Navy. Due to the structure of the repair contracting system, the Navy is unable to contract out to other firms without passing through the DCN. The Navy hopes to reduce its costs by centralizing its operations. It judges that by gathering the equipment and a team of "experts" in one place to conduct AVISO A69 IPERs, it should reduce overall costs.

Centralization should be a benefit if all other costs remain constant, but French sources have already reported that the DCN underestimated the time required to accomplish the work normally earmarked for the ship's company. Current DCN costs could be quite different from future DCN costs at Lorient if the Navy and the DCN do not communicate on what utilization rate is projected for the shipyard under the current fiscal constraints. The DCN may ultimately have to show more flexibility by possibly scaling down its work force to meet the Navy's reduced requirements.

Another example of the effects of a lack of communication between the two organizations is the *Floréal* class construction program. Saint-Nazaire and the DCN were supposed to work closely during the engineering phase in order to ensure that minimal additional work would be required once the ship passed from initial construction to weapons-system installation. This did not happen, and currently the ship is being extensively modified by the

DCN at Lorient in order to install the weapons systems. The construction contract at Saint-Nazaire is a fixed cost contract and the DCN Lorient installation package is a variable cost. Lack of communication between the two activities means more variable cost hours for the DCN because of cutting holes and routing cables throughout the ship in order to install the weapons. Careful communication would have ensured that the holes, cables, and cableways were already in place when the ship arrived at Lorient. Note, however that a fixed cost contract by its very nature induces the contractors to pass on any costs they can get away with.

The third area of potential cost-savings is in the domain of intra-Naval communications. Greater communication between the various verification and repair activities would avoid the current duplication of effort and lead to cost savings. The SCMNs organizations may need to standardize the way they conduct business. For example, although there is a manning shortage at the SCMN in Toulon, it still conducts its own repairs in order to avoid sending work to the DCN. This provides a cost savings for the Navy. In contrast, the SCMN in Brest is fully manned yet does not conduct any repairs. Work in Brest is accomplished either by the AMF or the DCN.

Secondly, both SCMNs are developing their own programs for tracking equipment casualties aboard ships in their respective ports. It appears that they are not communicating with each other to develop a unified system that would eventually facilitate an exchange of information. The French Navy might find it advisable to compile and correlate information in computerized form in order to have real-time data. Having two organizations develop two

different programs for the same purpose does not support a cost-cutting philosophy.

### **C. RECOMMENDATION FOR A CLOSER FRENCH/AMERICAN WORKING RELATIONSHIP**

The final area of potential cost savings is that of inter-naval communications. The French Navy and the U.S. Navy could benefit from a dialogue regarding administrative sciences and resource management. The French Navy already communicates with other Western European navies (such as the British and German Navies) that operate under similar cost constraints. Establishing direct communication with the U.S. Navy's ships' life cycle managers, engineering facilities such as NAVSSES, and the authorities responsible for new construction (Commander, Naval Sea Systems Command—NAVSEA), should help both navies attempts to get the longest life at the least cost from their equipment. For example, both the U.S. Navy and the French Navy are investigating cost/benefits of various vibration analysis equipment. Each is working separately and spending money on R&D, duplicating each other's efforts. Working closely on this and similar problems could yield cost savings to both navies in the future.<sup>41</sup> It is in the shared security interest of France and the United States that the two navies work together for the common defense of the Atlantic Alliance.

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<sup>41</sup>One potential roadblock to this inter-naval communication is that it would involve the French Navy encroaching upon DCN "territory," for all R&D in the area of shipboard maintenance is supposed to be in the domain of the DCN, and cost-effective measures discovered through inter-naval contacts could prove costly to DCN contracts.

## REFERENCES

1. James D. Gwartney and Richard L. Stroup, *Macroeconomics Private and Public Choice*, 4th ed. (San Diego, Ca.: Harcourt Brace Jovanovich, 1987), p. 533.
2. *Projet de loi de finances pour 1991 défense annexe—services votés—mesures nouvelles*, (Paris: Imprimerie Nationale), pp. 143-144.
3. Interview source of 3 October 1990.
4. Interview source of 2 October 1990.
5. Interview source of 23 April 1991.
6. Interview source of 9 October 1990.
7. Interview source of 23 April 1991.
8. Interview source of 26 April 1991.
9. Interview source of 2 October 1990.
10. Interview source of 22 April 1991.
11. Interview source of 3 October 1991.
12. Interview source of 26 April 1991.
13. Interview source of 23 April 1991.
14. État-Major de la Marine, *Instruction no. 198/EMM/LOG/EF relative à l'entretien des bâtiments de la flotte, Annexe A. rythme de principe des IPER des bâtiments allocation de jours de PEI entre IPER*, (BOC/PP, 18 June 1990) pp. 1732-1734.
15. Interview source of 24 April 1991.
16. Interview source of 23 April 1991.
17. Interview source of 23 April 1991.
18. Interview source of 26 April 1991.

19. Interview source of 9 October 1990.
20. Interview source of 24 April 1991.
21. Interview source of 19 April 1991.
22. Interview source of 24 April 1991.
23. Interview source of 19 April 1991.
24. Interview source of 23 April 1991.
25. Interview source of 9 October 1990.
26. Interview source of 15 April 1991.
27. Interview source of 23 April 1991.
28. Interview source of 23 April 1991.
29. Interview source of 30 April 1991.
30. Interview source of 15 April 1991.
31. *Status of Resources and Training System (SORTS)*, NWP 10-1-11 (Rev. A.) p. 5-1.
32. Interview source of 9 October 1990.
33. Interview source of 2 October 1990.
34. Interview source of 11 October 1990.
35. Interview source of 25 April 1991.
36. Interview source of 25 April 1991.
37. Interview source of 3 October 1990.
38. Division "Plans," Bureau "Études Générales," *Dossier d'Information Marine*, 1990 ed., (État-Major de la Marine), pp. 16-17.
39. Michel Voisin, *Rapport d'information déposé en application de l'article 145 du règlement par la commission de la défense nationale et des forces*

*armées (1) sur les moyens de présence, actuels et futurs, de la marine nationale*, no. 1806, (Paris: Assemblée Nationale), p. 124.

40. Interview source of 24 April 1991.
41. Interview source of 25 April 1991.
42. Interview source of 24 May 1991.
43. Interview source of 9 October 1990.
44. Interview source of 24 April 1991.
45. Interview source of 24 April 1991.
46. Interview source of 14 May 1991.
47. F. Motta, "Double mise à flot à Saint-Nazaire pour la marine nationale: la frégate de surveillance 'Floréal' et le bâtiment d'essais et mesures 'Monge'," *Le Télégramme*, 8 October, 1990, p. 4.
48. Interview source of 25 April 1991.
49. Interview source of 24 May 1991.
50. Interview source of 8 October 1990.
51. Interview source of 24 April 1991.
52. Interview source of 23 April 1991.
53. Interview source of 24 April 1991.
54. Interview source of 22 April 1991.
55. Interview source of 24 April 1991.
56. Interview source of 23 April 1991.
57. Interview source of 8 October 1990.
58. Interview source of 25 April 1991.
59. Interview source of 2 October 1990.

60. Service d'Information et de Relations Publiques des Armées, "La Défense en Chiffres 1991," *Armées d'Aujourd'Hui*, Pamphlet 157 (Paris: SIRPA February 1991), p.6.
61. Service d'Information et de Relations Publiques des Armées, *Le Service National en Chiffres 1990*, Pamphlet (Paris: SIRPA), pp. 3-12.
62. Interview source of 15 April 1991.
63. OPNAVINST 1160.6A, *Selective Reenlistment Bonus, Enclosure 2*, (28 May 1987), pp. 2-5.
64. CNO WASHINGTON DC 282338Z FEB 91, Selective Reenlistment Bonus (SRB).
65. Interview source of 1 October 1990.
66. Interview source of 15 April 1991.
67. Centre d'Instruction Naval de Saint-Mandrier, *Le Centre d'Instruction Naval de Saint-Mandrier*, Pamphlet, p. 6.
68. Interview source of 15 April 1991.
69. Interview source of 15 April 1991.
70. Interview source of 13 May 1991.
71. Michel Voisin, *Rapport d'information déposé en application d'article 145 du règlement par la commission de la défense nationale et des forces armées (1) sur les moyens de présence, actuels et futurs, de la marine nationale*, no. 1806, (Paris: Assemblée Nationale), p. 90.
72. Interview source of 23 May 1991.
73. Interview source of 17 April 1991.
74. Institut National des Statistiques et Études Economiques (INSEE).
75. François Hollande, *Rapport fait au nom de la commission des finances, de l'économie générale et du plan (1) sur le projet de loi de finances pour 1991 (no. 1593 et lettre rectificative no. 1627), no. 1635, Annexe no. 39* (Assemblée Nationale, November 1990) pp. 41-43.
76. Interview source of 1 October 1990.



77. Interview source of 15 April 1991.
78. Interview source of 14 May 1991.
79. Interview source of 15 May 1991.
80. Interview source of 15 May 1991.
81. Maurice Faivre, "Les chiffres du service national (deuxième partie)," *Défense Nationale*, December 1990, pp. 176-77.
82. Christian Makarian, "Les français pour l'armée de métier," *Le Point*, 965 (March 1991), p. 49.
83. Maurice Faivre, "Les chiffres du service national (deuxième partie)," *Défense Nationale*, December 1990, p. 177.
84. Maurice Faivre, "Les chiffres du service national (deuxième partie)," *Défense Nationale*, December 1990, pp. 176-78.
85. Interview source of 17 April 1991.
86. Interview source of 2 October 1990.
87. Interview source of 5 October 1990.
88. Maurice Faivre, "Les chiffres actuels et futurs du service national (première partie)," *Défense Nationale*, November 1990, p. 184.
89. Service d'Information et de Relations Publiques des Armées, *Le Service National en Chiffres 1990*, Pamphlet (Paris: SIRPA), pp. 20-21.
90. Service d'Information et de Relations Publiques des Armées, *Le Service National en Chiffres 1990*, Pamphlet (Paris: SIRPA), p. 3.
91. Service d'Information et de Relations Publiques des Armées, *Le Service National en Chiffres 1990*, Pamphlet (Paris: SIRPA), p. 23.
92. Information in a FAX to the author from Jacqueline Linard, Service d'Information et de Relations Publiques des Armées (DEPE/BE), May 7, 1991.
93. Christian Makarian, "Les français pour l'armée de métier," *Le Point*, 965 (March 1991), pp. 48-49.

94. Ewen Faudon, "La guerre avec l'Irak et la programmation militaire française," *Libération*, (27 February 1991).
95. Pierre Lellouche, "France: école de guerre," *Le Point*, 963 (March 1991), p. 61.
96. Interview source of 23 April 1991.
97. Interview source of 15 April 1991.
98. Jean Schmitt, "Armée: tout ce qui va changer," *Le Point*, 965 (March 1991), p. 44.
99. Catherine Durandin, et. al., *Dictionnaire de la Défense et des Forces Armées Les Hommes, Les Moyens, Les Missions*, (Paris: Larousse, 1988), pp. 145-146.
100. Fr. Gérin-Raze, "Le service militaire en question II—armée de métier ou conscription?" *La Presse Française*, (2-8 February 1991), p. 5.
101. François Hollande, *Rapport fait au nom de la Commission des Finances, de l'économie Générale et du Plan (1) sur le projet de loi de finances pour 1991 (no. 1593 et lettre rectificative no. 1627), no. 1635, Annexe no. 39 (Assemblée Nationale, November 1990) pp. 18-20.*
102. Jean-Yves Boulic, "La France reverra sa défense," *Ouest France*, 12 February, 1991.
103. Interview source of 23 April 1991.
104. État-Major de la Marine, *Instruction no. 198/EMM/LOG/EF relative à l'entretien des bâtiments de la flotte.*, (BOC/PP, 21 December 1983) p. 7993.
105. Interview source of 23 April 1991.
106. Interview source of 9 October 1990.
107. Interview source of 9 October 1990.
108. Interview source of 9 October 1990.
109. Interview source of 23 April 1991.
110. Interview source of 15 April 1991.

111. Interview source of 22 April 1991.
112. William A. McEachern, *Economics A Contemporary Introduction* (Cincinnati, Ohio: South-Western Publishing Co. 1991), p. 31.
113. Institut National des Statistiques et Études Economiques (INSEE).
114. Interview source of 22 April 1991.
115. Department of the Navy, Surface Warfare Plan 1989, p. 5.
116. Department of the Navy, Surface Warfare Plan 1989, p. 6.
117. Department of the Navy, Surface Warfare Plan 1989, pp. 6-7.
118. Centre d'Instruction Naval de Saint-Mandrier, *Le Centre d'Instruction Naval de Saint-Mandrier*, Pamphlet, p. 6.
119. Interview source of 15 April 1991.

## BIBLIOGRAPHY

Bonne. "Le budget 1989 de la Marine." *Cols Bleus*, 2017 (7 Jan.1989), 8-10.

Boucheron, Jean-Michel. *Rapport sur le projet de loi de programmation (no. 733) relatif à l'équipement militaire pour les années 1990-1993*. Paris: Assemblée Nationale.

Boulic, Jean-Yves. "La France reverra sa défense." *Ouest France*, 12 February 1991, cols. 1-4.

Centre d'Instruction Naval de Saint-Mandrier. *Le Centre d'Instruction Naval de Saint-Mandrier*, Pamphlet.

Dillon, G.M. *Defence Policy Making: A Comparative Analysis*. Leicester University Press, 1988.

Division "Plans," Bureau "Études Générales." *Dossier d'Information Marine*, 1990 ed. État-Major de la Marine.

Dumas, Marie-Lucy and Maurice Faivre. "La défense et l'éducation renforcent leur coopération—les formes non militaires du service national" *Défense Nationale*, June 1989, 181-84.

Durandin, Catherine., et. al. *Dictionnaire de la Défense et des Forces Armées Les Hommes, Les Moyens, Les Missions*, Paris: Larousse, 1988.

Edmonds, Martin. *Central Organizations of Defense*. Boulder, Co.: Westview Press, 1985.

État-Major de la Marine, *Instruction no. 198/EMM/LOG/EF relative à l'entretien des bâtiments de la flotte*. BOC/PP, 21 December 1983.

Faivre, Maurice. "Les chiffres actuels et futurs du service national (deuxième partie)" *Défense Nationale*, December 1990, 176-81.

Faivre, Maurice. "Les chiffres actuels et futurs du service national (première partie)" *Défense Nationale*, November 1990, 182-85.

Faudon, Ewen. "La guerre avec l'Irak et la programmation militaire française." *Libération*, 27 February 1991.

Gérin-Raze, Fr. "Le service militaire en question II—armée de métier ou conscription?" *La Presse Française*, (2-8 February 1991), 5.

Gourmelon, Joseph. *Avis présenté au nom de la commission de la défense nationale et des forces armées sur le projet de loi de finances pour 1990* (no. 895), TOME VIII *défense marine*, no. 923 Paris: Assemblée Nationale.

Gourmelon, Joseph. *Avis présenté au nom de la commission de la défense nationale et des forces armées sur le projet de loi de finances pour 1991* (no. 1593 et lettre rectificative no. 1627) TOME VIII *défense marine*, no. 1638 Paris: Assemblée Nationale.

Gwartney, James D., and Richard L. Stroup, *Macroeconomics Private and Public Choice*, 4th ed. San Diego, Ca.: Harcourt BraceJovanovich, 1987.

Hollande, François. *Rapport fait au nom de la Commission des Finances, de l'économie Générale et du Plan (1) sur le projet de loi de finances pour 1991*. No. 1635 Annexe No. 39. Paris: Assemblée Nationale, November 1990.

Le Dantec. "Le budget de la Marine en 1991," *Cols Bleus*, 2108(12 Jan. 1991), 4-7.

Lellouche, Pierre. "France: école de guerre," *Le Point*, 963 (March 1991), 61.

Louzeau, Bernard. "Quelle Marine Pour la France?" *Défense Nationale*, (October 1990), 13-25.

Makarian, Christian. "Les français pour l'armée de métier." *Le Point*, 965 (March 1991), 48-51.

McEachern, William A. *Economics a Contemporary Introduction*. Cincinnati, OH.: South-Western Publishing Co. 1991.

Motta, F. "Double mis à flot à Saint-Nazaire pour la marine nationale: la frégate de surveillance 'Floréal' et le bâtiment d'essais et mesures 'Monge'," *Le Télégramme*, 8 October 1990, p. 4.

OPNAVINST 1160.6A. *Selective Reenlistment Bonus*. 28 May 1987.

*Projet de loi de finances pour 1987 défense annexe—services votés—mesures nouvelles*. Paris: Imprimerie Nationale, 1986.

*Projet de loi de finances pour 1988 défense annexe—services votés—mesures nouvelles*. Paris: Imprimerie Nationale, 1987.

*Projet de loi de finances pour 1989 défense annexe—services votés—mesures nouvelles.* Paris: Imprimerie Nationale, 1988.

*Projet de loi de finances pour 1990 défense annexe—services votés—mesures nouvelles.* Paris: Imprimerie Nationale, 1989.

*Projet de loi de finances pour 1991 défense annexe—services votés—mesures nouvelles.* Paris: Imprimerie Nationale, 1990.

Ruel, Serge. "Les couts des armements: mythes et réalités des systèmes prévisionnels," *Défense Nationale*, November 1990, 79-91.

Schmitt, Jean. "Armée: tout ce qui va changer," *Le Point*, 965 (March 1991), 42-48.

Service d'Information et de Relations Publiques des Armées. "La Défense en Chiffres 1991" *Armées d'Aujourd'Hui*, Pamphlet 157. Paris: SIRPA, February 1991.

Service d'Information et de Relations Publiques des Armées. *Le Service National en Chiffres 1990*, Pamphlet. Paris: SIRPA.

Tenneson, Philippe. "Militaires et temps disponible," *Défense Nationale*, December 1990, 87-97.

Voisin, Michel. *Rapport d'information déposé en application de l'article 145 du règlement par la commission de la défense nationale et des forces armées (1) sur les moyens de présence, actuels et futurs, de la marine nationale.* no. 1806. Paris: Assemblée Nationale.

## APPENDIX A. VOCABULARY TRANSLATIONS

The following major vocabulary translations are provided for use in understanding this thesis:

- A. IPER (Indisponibilité Périodique d'Entretien et de Réparation)—A ship is out of service for a period of 1 to 6 months for upkeep or to effect repairs. The work is accomplished under the direction of the DCN (defined below) using civilian labor. The U.S. Navy equivalent is SRA (Ship Repair Availability). [Ref. 104]
- B. PEI (Périodes d'Entretien Intermédiaire)—The ship is dockside for under one month. If the ship can be gotten underway in less than 72 hours, it is considered operationally available. If not, it is said to be unavailable for reasons of upkeep. The work is accomplished under the direction of the AMF (defined below) and uses only military labor. U.S. Navy equivalent is IMAV (Intermediate Maintenance Availability). [Ref. 105]
- C. SCMN (Service de Contrôle du Matériel Naval)—A unit of approximately 90 highly technically skilled senior petty officers who investigate any equipment problems aboard ships and recommend the corrective action. They are rapid technical troubleshooters. [Ref. 106]
- D. AMF (Atelier Militaire de la Flotte)—Career naval shore personnel who specialize in shipboard repairs. The U.S. Navy equivalent is SIMA (Ship Intermediate Maintenance Activity). [Ref. 107]
- E. Majorité Générale—This unit assures the protection, defense, security, policing, and good order of the base. In addition it coordinates the various military and civilian management support for the ships. The unit is responsible for centralizing the work requests and dividing them amongst the support organizations for accomplishment. This section is divided into two branches: ship upkeep and ships under construction (sea trials). The upkeep branch is further subdivided into hull, machinery & electricity, and weapons. The person who is billeted to head the Majorité Générale is called the Major Général, and he is normally either a captain or rear admiral. [Ref. 108 and 109]
- F. DCN (Direction des Constructions Navales)—Civilian branch of the defense department (Ministère de la Défense) organization responsible for naval ship construction and weapon systems. It oversees the naval

shipyards at Brest, Toulon, Cherbourg, and Lorient. The U.S. Navy equivalent is SUPSHIP (Supervisor of Shipbuilding). In the area of shipboard upkeep and maintenance the Director of the DCN works directly for the Chief of Naval Operations (Chef d'État-Major de la Marine); this is not the case in new construction. Here he works directly for the Délégation Générale pour l'Armement (DGA) who is responsible for construction in all of the Armed Forces.[Ref. 110 and 111] (See Figure A-1.)

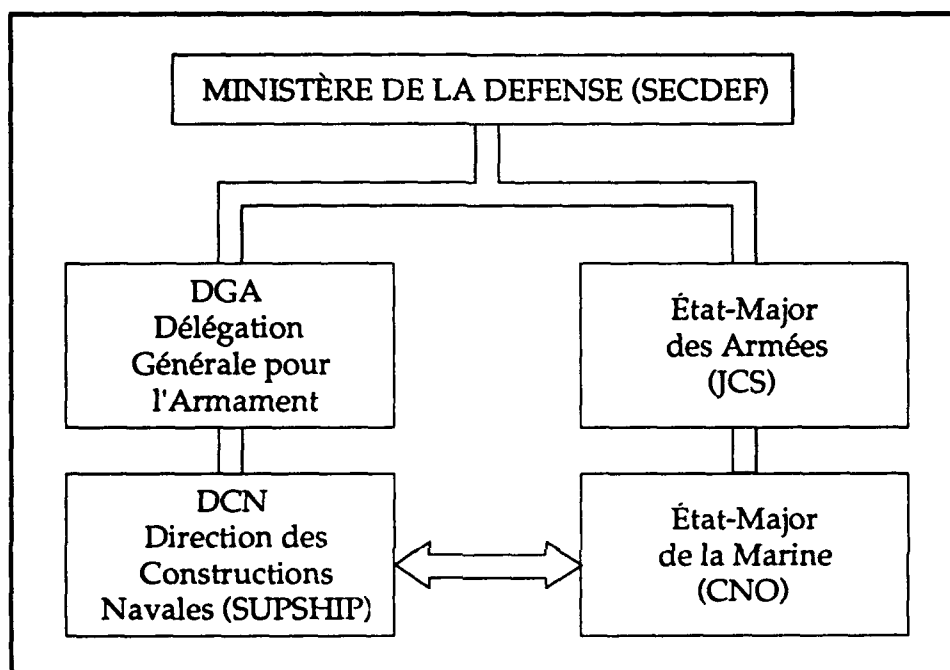


Figure A-1. DCN and French Navy Organizational Relationship



## APPENDIX B. U.S. NAVAL READINESS MEASUREMENTS

The U.S. Navy measures combat or mission readiness using several analytical tools. The first and basic document is the Projected Operational Environment (POE) and Required Operational Capabilities (ROC), established for each ship class in the OPNAVINST C3501 series of instructions. The POE and ROC defines mission areas (e.g., AAW, ASUW, CCC, MOB-E (engineering mobility), etc.) that the class must be capable of performing.

The U.S. Navy measures the ability of a ship to conduct operations in each mission area through the SORTS (Status of Resource and Training System) reporting system. SORTS requires the ship to report combat (C-1-C-4) and mission (M-1-M-4) readiness.

Combat readiness is measured by a C-rating in each of four resource categories: Personnel, Supply, Equipment, and Training. Personnel readiness comes from comparing the number of people in each required rating actually onboard and their NECs (Navy Enlisted Classifications—skill levels) with what the manning documents show the ship should have. Manning documents indicate which ratings a ship is required to have to support a given mission area. Supply readiness comes from logistics documents showing, e.g., what spare parts, consumables, ammunition, etc. the ship is required to carry to be C-1. Equipment readiness reflects equipment casualties affecting the ability to conduct operations in mission areas. Specific C-ratings are found in TYCOM (Type commanders—e.g., Commander Naval Surface Forces Atlantic) instructions dealing with casualty reporting (CASREPS). Training readiness reflects completion of training exercises within specified

periodicities. A given mission area, say MOB-E, has a variety of drills, exercises, trainers, and required schools associated with it, along with specified training periodicities and numbers of trainer and school graduates required.

Mission area readiness is then measured using the four C-rating inputs to determine the M-rating for that mission area.

Combat and Mission readiness C and M-ratings are then combined through a worksheet procedure. All C and M-ratings plus an overall combat readiness rating are then reported in the SORTS system. Whenever one or more of the ratings changes, a new SORTS message must be sent. These messages are used to brief the TYCOMS three times per week (at least for surface ships).

This system is very mechanical and as such may not reflect certain deficiencies. However, a Commanding Officer and or his immediate superior in the chain of command (ISIC) can subjectively determine whether or not a ship can meet its operational tasking.

## APPENDIX C. GOVERNMENT PURCHASES

One way to measure Gross National Product (GNP) is through expenditure on final goods and services during a particular year. The basic equation is:

$$Y = C + I + G + (X - M)$$

where: Y represents GNP

C represents CONSUMPTION (consumer purchases)

I represents INVESTMENT (gross private domestic investment)

G represents GOVERNMENT EXPENDITURES

X represents EXPORTS

M represents IMPORTS

ASSUMPTION: For purposes of this discussion, suppose the current account is in balance such that  $(X - M)$  is zero (or negligible). Then  $Y = C + I + G$

Focusing on G, government purchases can be broken down into "non-defense" purchases ( $G_{ND}$ ) (i.e. government administration) and "defense" purchases ( $G_D$ ) (i.e. the defense budget). This yields:

$$Y = C + I + G_{ND} + G_D$$

The Production Possibilities Frontier (PPF) "is a curve showing all combinations of goods that can be produced when available resources are used fully and efficiently." [Ref. 112] This means that if all resources are used fully, any combination of two goods that are produced is found along the curve. Assume the two goods can be measured as total non-defense expenditures ( $C + I + G_{ND}$ ) and total defense expenditures ( $G_D$ ). Then the PPF looks as shown in Figure C-1.

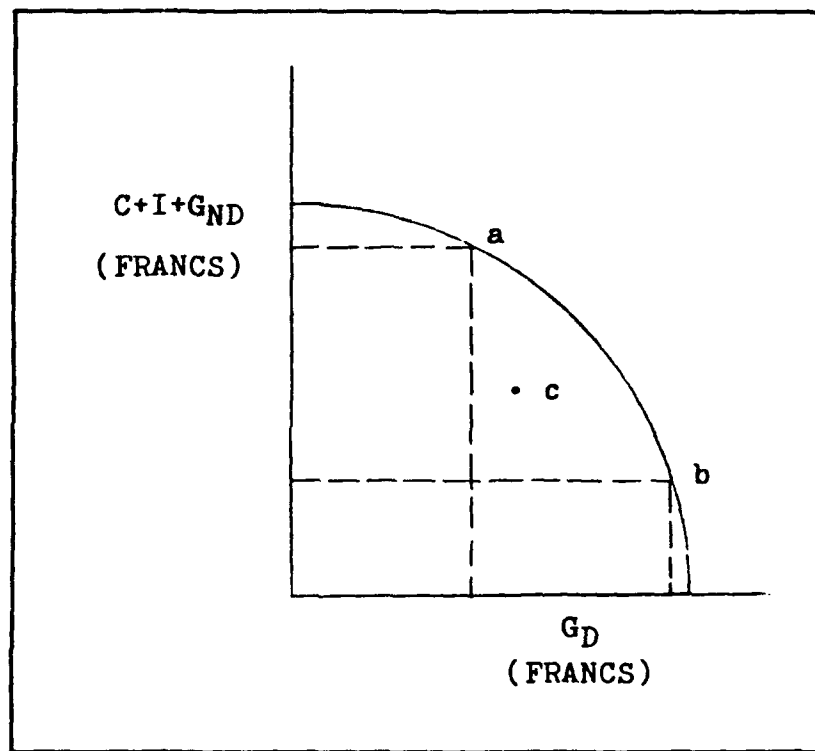


Figure C-1. Non-defense and Defense Expenditures

This PPF curve represents the choices to the government and the economy.

Either:

- more can be spent on non-defense (moving to the left on the curve—point (a)) leaving less money for defense; or
- less can be spent on non-defense (moving to the right on the curve—point (b)) leaving more money for defense.

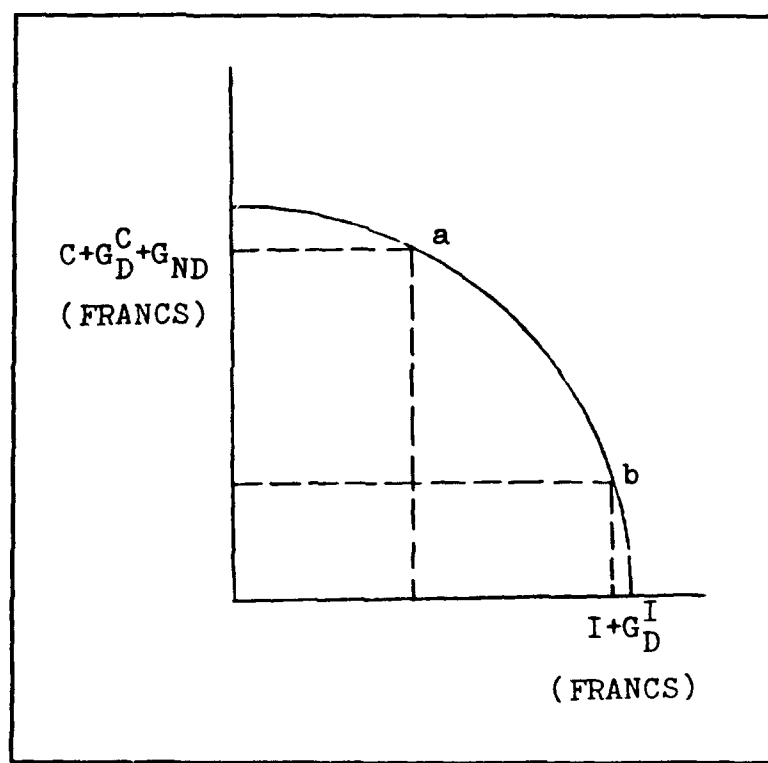
If the government finds itself at a point below the curve (at c), it is not operating efficiently using all available resources. The curve is subject to shifting outward or inward depending on whether there is an increase or decrease in available resources or improvements in technology.

Government defense purchases ( $G_D$ ) can be further broken down into two components, "consumption" ( $G_D^C$ ) and "investment" ( $G_D^I$ ). The consumption component can roughly be represented by Title III (salaries,

social benefits, and Operations and Maintenance) of the French defense budget. The investment component of government defense expenditures are reflected in Title V (new construction, overhauls, and-in the case of the French Navy-the strategic nuclear submarines). The new formula for GNP can be written as:

$$Y = C + I + G_{ND} + G_D^C + G_D^I$$

Looking at two components of GNP "consumption" ( $C + G_D^C$ ) and "investment" ( $I + G_D^I$ ) a different PPF curve can be derived. See Figure C-2.



**Figure C-2. Government Defense Purchases—Consumption and Investment**

For a constant amount of  $C$  and  $I$ , if the government increases defense consumption (i.e. increases the operating tempo and keep ships at sea thereby deliberately increasing fuel consumption in the Operations and Maintenance

account of Title III), it will be at point (a) on the curve. Conversely, if it decides to invest more (i.e. build more ships, research and development, etc., with Title V), it will move to the right along the curve to point (b). This curve represents the constant fight between Title III and Title V accounts. Given that the Navy budget stays relatively constant, as one account is increased the other decreases.

The significance of investment is that it augments the resources available for both defense ( $G_D$ ) and non-defense ( $G_{ND}$ ) goods and services in the future. So by sacrificing some present consumption ( $G_D^C$ ) for investment ( $G_D^I$ ), the gain is greater future production (and consumption) possibilities. Figures C-3, C-4, and C-5 display shifts in the PPF that occur when consumption (C), and investment (I), and non-defense expenditures  $G_{ND}$  are held constant and changes occur in defense consumption ( $G_D^C$ ) and investment ( $G_D^I$ ). Figure C-3 depicts the case where increasing the amount of defense consumption ( $G_D^C$ ) (from a to a') leads to a small, future increase in resources (life expectancy of ship).

Figure C-4 depicts the case where increasing the amount of defense investment ( $G_D^I$ ) (from a to b) implies spending less on present consumption; this leads to more resources being available in the future for consumption.

Figure C-5 shows the effect of a technological discovery (e.g., a new welding process for assembling the hull of a ship) in increasing investment ( $G_D^I$ ) which is not reflected in an increase in consumption ( $G_D^C$ ). The French Navy can also use this curve to explain shifting upkeep funds from Title III to Title V in 1989 and 1991. These upkeep funds were used for major maintenance ( $G_D^I$ ) that implied less minor maintenance ( $G_D^C$ ) in the future.

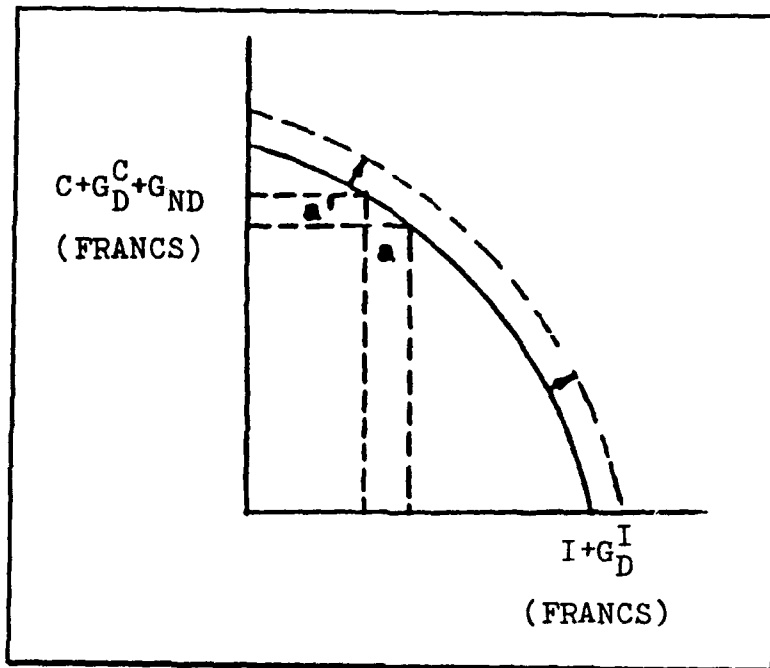


Figure C-3. Increasing Defense Consumption

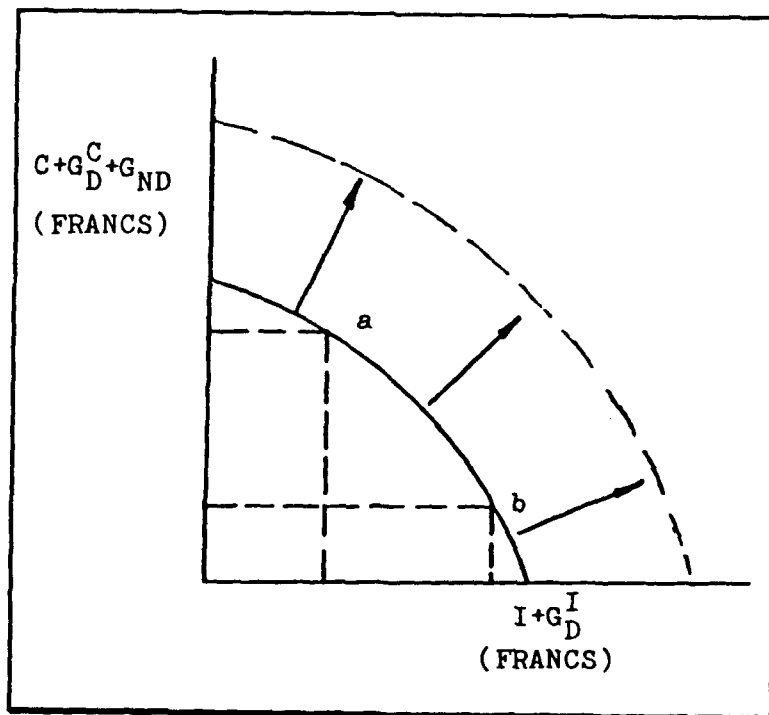
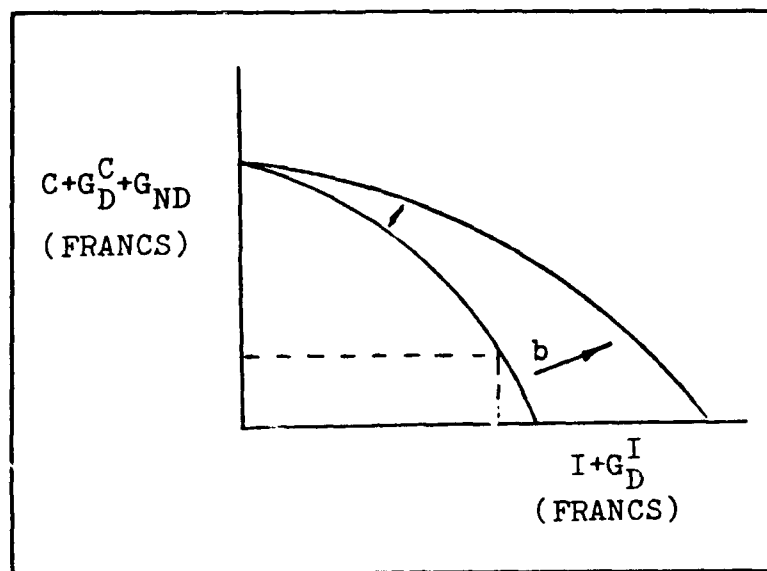


Figure C-4. Increasing Defense Investment



**Figure C-5. Technological Discovery Effect on Increasing Investment**



## APPENDIX D. DIRECTION DES CONSTRUCTIONS NAVALES COSTS

This appendix explains in simple, but general, terms the Direction des Constructions Navales (DCN) costs to the Navy. The basic DCN costs come from the cost of government workers called POEs (Personnel Ouvrier d'État).<sup>42</sup> The formula for calculating the total cost of POE workers is:

$$\text{TOTAL POE COST} = (\text{NUMBER of POEs}) \times (\text{SALARY per POE})$$

As an example, if a worker's salary is 115,000FF (\$21,000) and there are 5000 workers (the number of POEs at DCN Lorient), the POE COST is 577,500,000FF (\$105,000,000).

If the POE's salary increases faster than the rate of inflation (3.4% in 1990), which according to a French source is in fact the case, the POE COST will be an even greater share of Navy costs.[Ref. 113 and 114] Given that the French Navy's budget remains constant, or grows at the rate of inflation (or, worse, decreases), the POE COST takes up a greater proportion of the Navy budget and decreases the amount of money the Navy can spend on other projects (e.g. on maintenance).

The POE COST growth is graphically illustrated in Figure D-1.

Average Fixed Costs (AFC) are calculated by dividing POE COST by the number of hours of workload. Looking at Figure D-2, as the workload

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<sup>42</sup>This is actually only one part of the DCN cost, because the complete cost also includes consumption of electricity, DCN building maintenance costs, and other overhead costs. The total DCN cost is made up of variable costs (i.e. electricity consumption) and overhead cost (i.e. building rental) and the POE cost. Overhead and POE costs represent the total fixed costs but this thesis focuses on the largest fixed component, POE cost.

(measured in hours) increases, the AFC decreases. The French Navy has been decreasing the amount of work it is giving to the DCN ( $W_1$  to  $W_2$ ) so by Figure D-2 one can see that the DCN's fixed costs associated with each project ( $W$ ) increases (from  $AFC_1$  to  $AFC_2$ ).

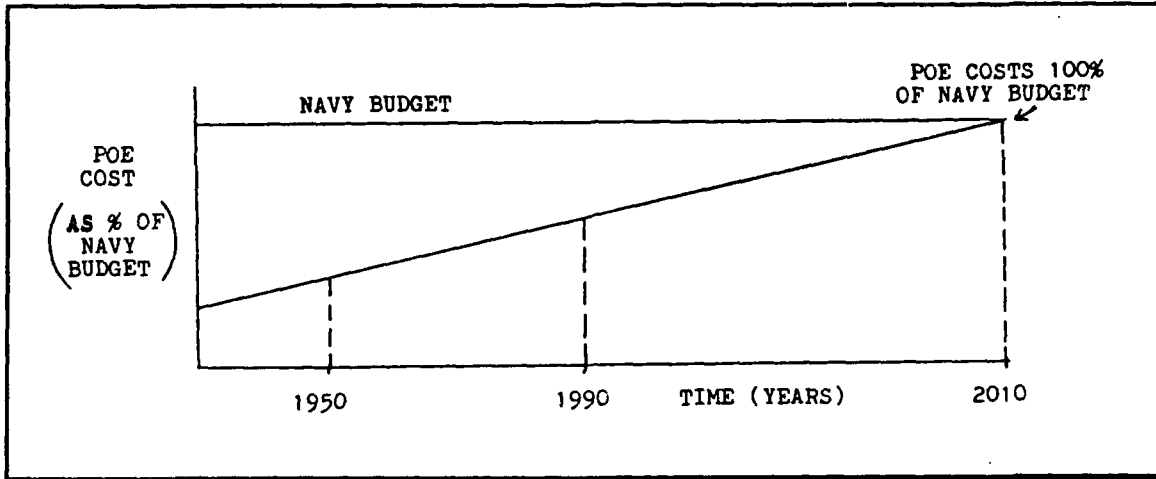


Figure D-1. POE Cost Growth Simulation

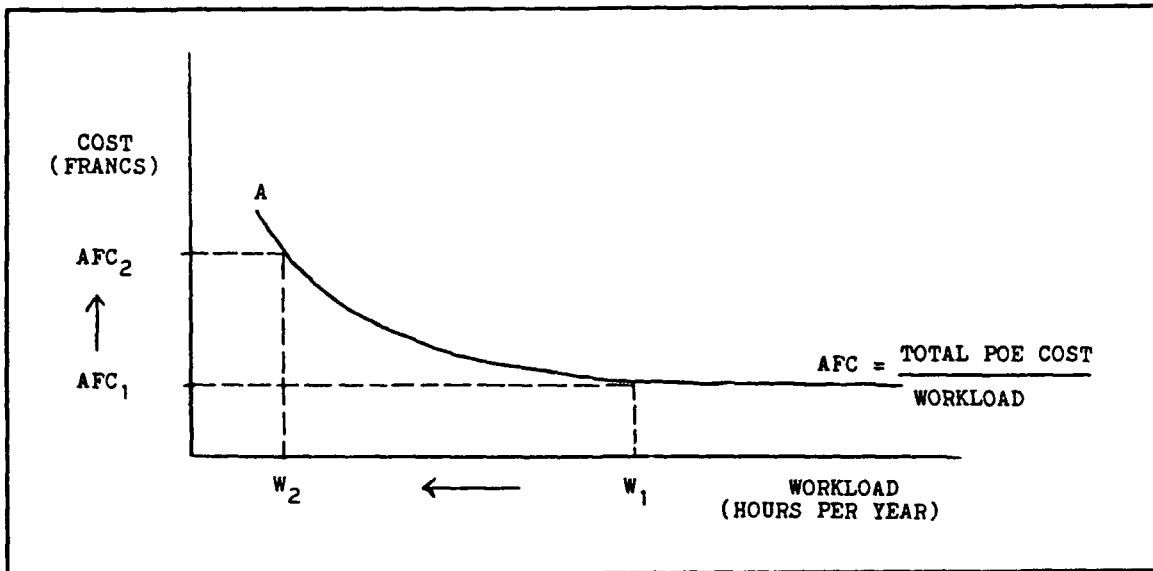


Figure D-2. Average Fixed Costs (AFC)

## APPENDIX E. A SHIP'S LIFE EXPECTANCY

Does spending more money on maintenance each year increase the life of a ship? Is it possible to spend less and still achieve the same mission life expectancy? The historical data which for the French Navy are very cumbersome, with mainly hard copy records and very little computerized historical data.

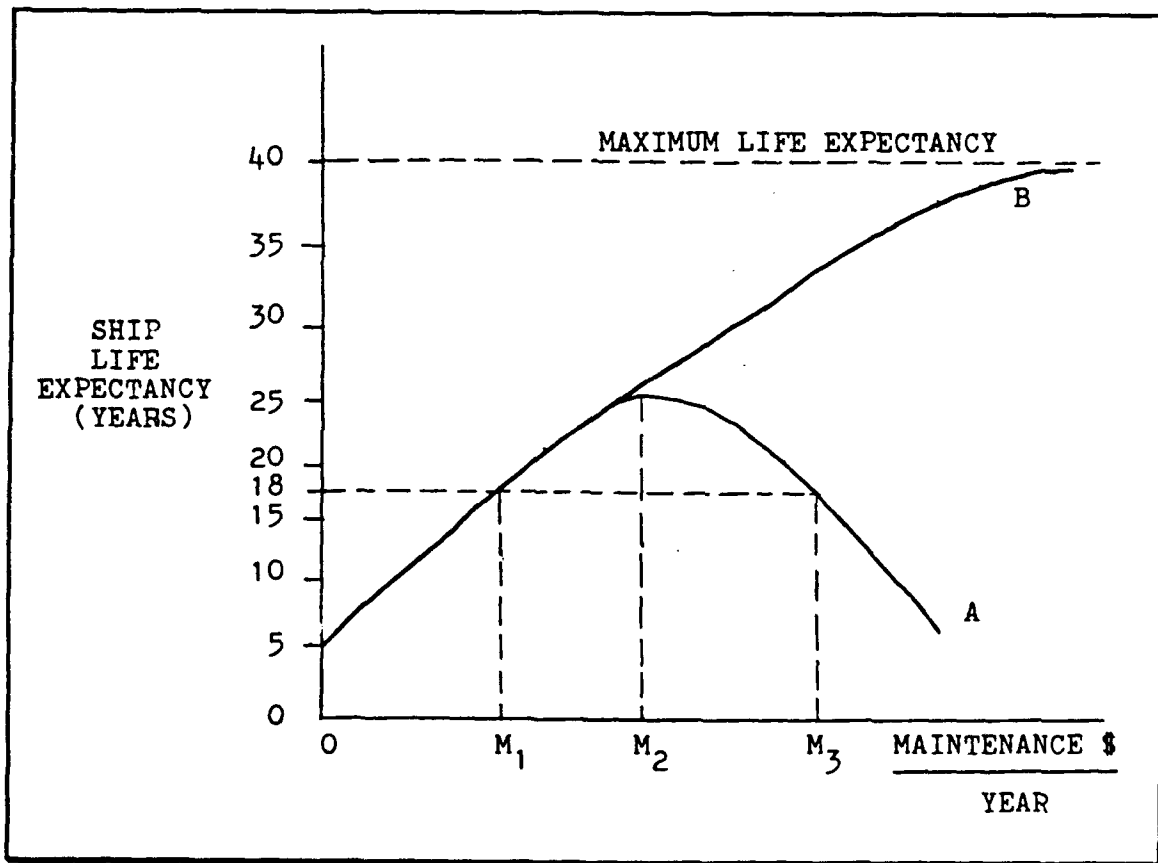


Figure E-1. The Effect of Increasing the Amount of Maintenance per Year on the Ship's Life

The graph in Figure E-1 represents two situations:

- increasing the amount of maintenance per year will extend the life of a ship to a certain point and then any increase will actually decrease the life of the ship along curve (A).
- increasing the amount of maintenance per year to a certain level will continuously increase the life of a ship, but with diminishing returns (curve B).

Curve (A) represents the first situation. The amount of maintenance conducted in a particular year (calculated as Dollars of Maintenance per year) is point  $M_1$ , which will give a life span of 18 years. Point  $M_2$  represents the maximum ship's life span one can hope to achieve no matter how much maintenance is conducted. Point  $M_3$  represents the ship's life span decrease that occurs because of the amount of maintenance conducted. If a piece of equipment is taken apart too often, there is a risk of imposing equipment failure (e.g., incorrectly reassembling parts or causing damage to close clearance machinery parts). As the saying goes "if it isn't broken, don't fix it!" This graph clearly shows that if a Navy determines what life expectancy it wants from a ship, it can use equipment failure historical data to predict the amount of maintenance dollars to spend, thus avoiding useless overspending.

Curve (B) represents the possibility that spending more for maintenance will actually increase the life of a ship. This too will reach some maximum point where any additional maintenance dollars expended will neither increase nor decrease the life expectancy of a ship (whether or not it is cost-effective on other grounds to spend that amount). Historical data would help to predict the maximum maintenance dollars to spend to achieve maximum life for a ship.

The U.S. Navy is introducing a new concept for extending the life of a ship. The new concept calls for a ship that will actually have two "service" lives. The ship is the DDG-51 Arleigh Burke class, which will eventually replace all of the destroyers and cruisers in the U.S. Navy. Its first service life will be as a Battle Force Combatant (BFC).

The BFC is a multi-mission ship equipped with a phased array radar, an AEGIS-type battle management system, a vertical launch system of 90-120 cells, an advanced surface-to-air missile, and an advanced SQQ-89 anti-submarine combat system.[Ref. 115]

This service life will be from commissioning to the 20-year point, at which time the ship will enter a "new" service life role of Protection of Shipping (POS). This role will have destroyers (eventually only DDG-51 class) replace the current frigates in the U.S. Navy.

The POS is also a multi-mission ship but with an emphasis on ASW. It must have a capable short range AAW system, an ASW system which provides a high probability of detection at extended ranges, two helicopters and a quick-reaction vertical launch ASW weapon.[Ref. 116]

This role will have a service life of at least 20 years and possibly beyond. The key to this is called "Flexible Transition."

This concept assumes that a ship at commissioning is able to meet the most demanding threat in the BFC role. As the threat increases over time, the ship's ability to meet its BFC mission degrades. To overcome this shortfall in the most cost effective manner, older ships in the BFC force are shifted to the less demanding POS mission at the mid-point of a 40-year expected service life and replaced with new ships in the BFC force. Although reliability, maintainability, safety, and fact of life repair and some minimum level of modernization will remain a requirement, the very expensive backfit of modern combat systems designed to pace the most demanding threat will not be accomplished. Flexible Transition reassigns a ship to missions more in keeping with its capabilities as the ship matures. [Ref. 117]

This process is not directly applicable to the French Navy because the number of ships built per class is relatively small (6 for the *Floréal* class); but it is an alternative that could be explored. Changing the ship's mission at the mid-point of her expected service life could have an impact on the type and frequency of maintenance required. As the French Navy continues to build ships (regardless of the pace), it could place the new ships into the most arduous roles and shift the others to less demanding assignments.

## APPENDIX F. HUMAN CAPITAL INVESTMENT

Appendix (C) introduced the concept that government defense purchases ( $G_D$ ) is broken down into two components "consumption" ( $G_D^C$ ) and "investment" ( $G_D^I$ ). In the context of human capital, "investment" can be further broken down into two subcomponents "transferable" ( $G_{TD}^I$ ) and "non-transferable" ( $G_{NTD}^I$ ) investment in human capital. Each of these refers to the skills that are taught by the military that an individual may or may not be able to readily use in the civilian market.

In the case of "transferable" investment, while the individual enjoys the benefit of acquiring marketable skills, the problem is that the military must compete to retain these personnel. Moreover, the military is often more constrained than private employers in the type of benefit packages it can offer. This constraint comes from a fixed budget (fixed by an outside organization—the government). The military is forced to pay personnel of the same grade, active service time, and skill level in their various occupational categories the same wages. In the civilian market an employer can vary the wages paid to an individual based on competitive market forces in particular occupations. The military is confronted with the problem that the more it increases an individual's skills the more he will be marketable outside the military. This in turn increases the investment cost to the military because it pays for the training and then must offer a higher rewards package to keep the individual in the military. One alternative is to increase military pay flexibility to hire directly in the labor market, eliminating some training costs.

Non-transferable skills are those skills that an individual learns in the military that are not readily applicable in the civilian market. As described in Chapter II, gunnery is a prime example of non-transferable skill. The Navy will be in the position of a monopsonist in this case, because it is not concerned with the person taking his skill elsewhere. Since there is no competition with the civilian market for this individual, the Navy does not have to offer as attractive a benefits package in order to entice the individual to stay in the Navy. However, these occupations require that training be provided almost exclusively by the employer.



## APPENDIX G. CAREER PATH PROFILES

The following career path profiles are currently in the review process for possible implementation by the French Navy:

- Short Career: (less than 15 years active service)
  - Initial 8 year enlistment contract with a guarantee of attending BAT<sup>43</sup> training. (If the perspective recruit does not have a high initial aptitude rating he can be offered a 3 year vice 8 year contract).
  - Upon successful completion of the BAT he will be automatically advanced to Second Maître (Second Class Petty Officer—2/C PO).
  - Can receive a severance pay (equal to 14 month salary) if the person quits with 8 to 11 years of active service.
- Intermediate Career: (15 to 21 years active service)
  - Able to retire immediately and begin receiving retirement salary.
  - abandon the system of an upper and lower age limit for career personnel. Institute a one age limit system.
  - End career when person is about 40 years of age.
- Long Career: (more than 21 years of active service)
  - Reserve for personnel who have been offered the "Statut de Carrière" (full career contract)
  - change the age limit for Maître Principal (Senior Chief Petty Officer) and Major (Master Chief Petty Officer) from 52 and 55 to 55 and 56 respectively.[Ref. 119]

The current and projected (incorporating proposed career path changes) enlisted discharge profiles are graphically illustrated in Figure G-1.

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<sup>43</sup>BAT (Brevet d'Aptitude Technique)—elementary technical training where the individual learns basic skills for machinery maintenance and minor repairs.

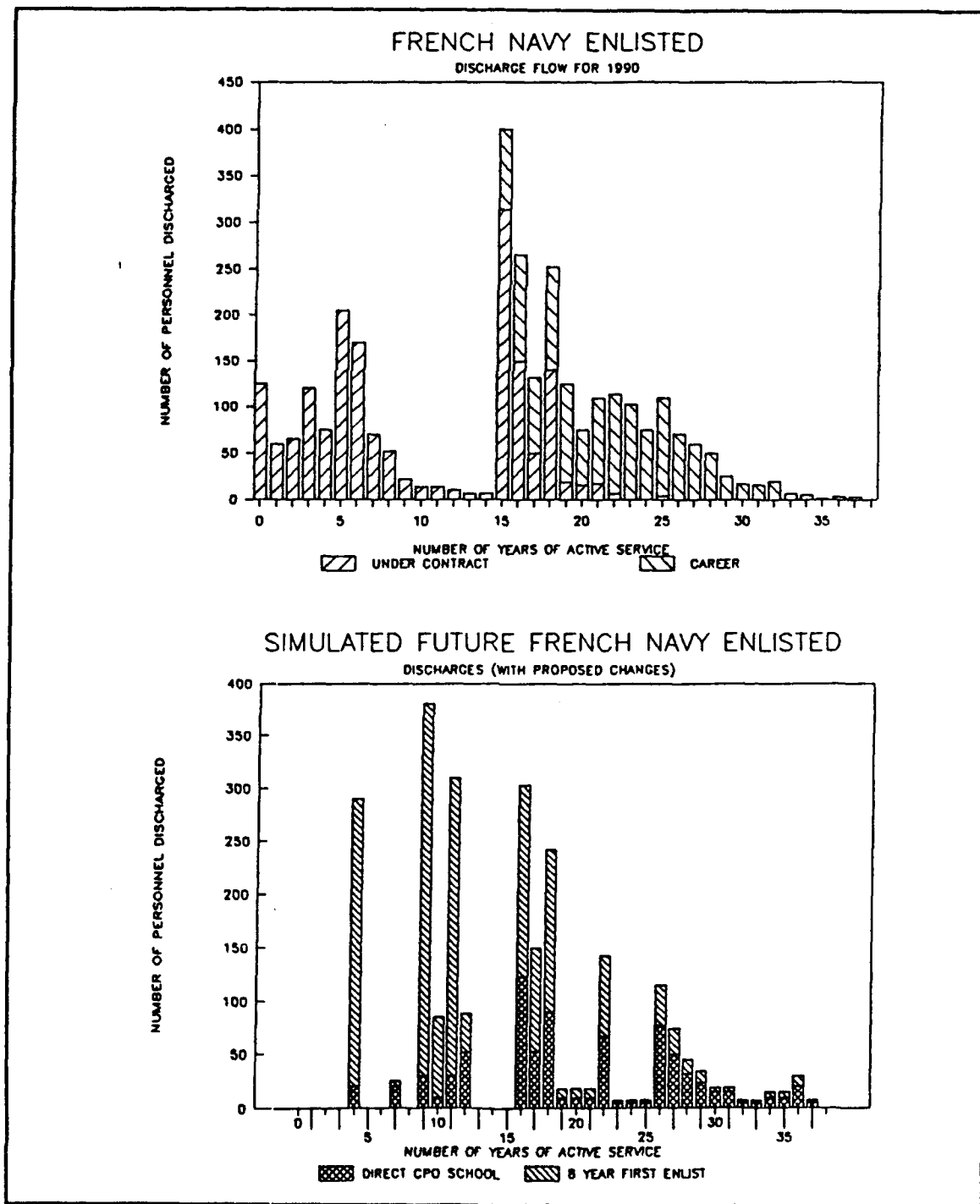


Figure G-1. French Navy Discharge Flow

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